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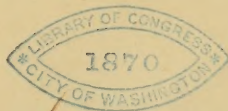
PEAR CULTURE

FOR PROFIT.

#7504

BY *Patrick* T. QUINN,

PRACTICAL HORTICULTURIST.



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P R E F A C E



THE pomological student, doubtless, will miss many things in this book, as it has been the author's aim to rigidly exclude all points that do not bear directly upon practical pear culture, whether for pleasure or profit—synonymous terms, for that matter, to many of us.

If one wishes to raise pears intelligently, and with the best results, he must know first the character of his soil—the best mode of preparing it, the best varieties to select under existing conditions, the best mode of planting, pruning, fertilizing, grafting, and utilizing the ground before the trees come into bearing, and, finally, of gathering and packing for market.

A grower not seldom defrauds himself of the legitimate profit of a fine pear crop by not knowing the best ways of marketing his fruit.

The hope of furnishing practical information on all these points, has induced the author

to endeavor to draw for others the same lessons which years of practical experience have afforded him.

The orchard record at the end of the book will be found simple and practical. Its usefulness to the fruit grower is evident, and if at any time the orchard should change hands, the existence of such a record accurately kept would materially enhance its value.

P. T. Q.

NEWARK, August 1st, 1869.

INTRODUCTION.

THAT the public interest in horticulture has received a marked stimulus within the last twenty-five years is fully proved by the increased number of nurseries now carried on successfully in this country. Mr. Barry stated, in a lecture delivered in New Haven a few years ago, that "there were in the United States 1,000 nurseries ; and in Monroe County, New York, there were 3,000 or 4,000 acres, producing annually \$500,000 worth of trees."

Notwithstanding the large sales of fruit trees, it is very surprising how few fine pear orchards are to be met with in any part of the country, and how numerous are the instances of neglected and ill-used fruit trees ; the roots vainly striving to obtain sustenance from an impoverished soil, while the body has been mutilated by carelessness, and the bark oftentimes covered with fungi and mosses, so as to

prevent the pores from performing the action for which nature intended them.

Whether this neglect of fruit trees arises from an ignorance of their wants, or from the prevalent and erroneous supposition that a tree once *in place can take care* of itself, I will not discuss at present. It certainly should be evident to every reflecting mind, that if five, ten, or fifteen bushels of apples or pears are taken from a tree annually, a diminution of the abstracted ingredients of the soil must occur in due time, unless an equivalent be replaced in the form of manure; and if not, the result soon becomes unprofitable.

My directions in this little work will be brief, and devoted principally to the culture of the pear for market purposes. In going over the ground, should there be any conclusions drawn that differ from the "laid-down rules," I will state them, because my experience of over a dozen years in growing pears for market has led me to accept them as facts, and by stating them (in case I am correct), some may be prevented from repeating the mistakes of which myself and many others have tasted the bitter fruit. It is indeed singular, but nevertheless true, that there are

but few persons who have planted pear trees in a large way who have not fallen into the same class of mistakes, and who by so doing have not had their pockets and patience sorely tried.

The science of growing trees that will produce choice fruit is very simple when once understood. It is during the time spent in wading in the dark, without any beacon to guide their steps, that the inexperienced suffer from a series of disappointments. It is folly to suppose that every person who plants an orchard of pear trees succeeds. On the contrary, as far as my personal observation has extended, there has been more money lost than made, for I could enumerate five persons who have utterly failed, to every *one* who has made pear culture profitable.

Think but an instant of the number of pear trees that have been sold annually for the past fifteen or twenty years, and then search for the healthy, vigorous orchards that should by this time be producing abundantly! Such orchards are but few in comparison with those of sickly, misshapen and unproductive trees everywhere to be found.

There are many obvious reasons for the nu-

merous failures that present themselves to our view on every side, and much valuable information has been arrived at by observation, but this has generally been found a very expensive means of gaining it. Under the excitement of "pear fever," many persons planted large fields without any preparation of the soil. Others selected long lists of varieties that were unsuited to their soil and climate. Others, again, believed that a fruit tree once in place could take care of itself without further expense or trouble to its owner.

It is only necessary to say in this connection that with such treatment and want of definite knowledge, pear culture cannot prove profitable. It is admitted to be necessary in the raising of fine live stock, as a business, that we must first become thoroughly familiar with the good and bad points of animals, the best and most economical methods of feeding, also the causes and treatment of the various diseases to which animals are subject, before we can pursue the vocation with any hope of success. The same is true of the orchardist. He should study the nature and habits of his trees, for the same treatment will not answer for all kinds; he should also know the prox-

imate composition of his soil, either by a previous knowledge of the crops grown on it, or by an analysis, so that he may renew those ingredients that are not already in sufficient quantity to meet the demands of the trees. A pear tree planted on a poorly prepared soil may often show signs of vigor and healthfulness for a few years, but the absence of the necessary constituents will soon become apparent, and unless some means are taken to restore them, premature death is sure to follow.

There is no good reason why the horticulturist should not know the anatomy of the trees, and the composition of the soil, as well as the skillful physician comprehends the condition and surroundings of the human body.

It is my intention in this work to present to the reader plain and thoroughly practical directions on pear culture, relating my own experience as far as possible. My desire is to give instructions so minute that those who may follow them will learn how to propagate a tree in the nursery row, prepare the soil for its permanent location, give it such attention during the early stages of growth as to insure a strong, vigorous tree, that when the time shall arrive for producing fruit, they

may, under favorable circumstances, receive an abundant yield. Again, the practical horticulturist has to learn the most approved method of preparing and packing fruit for market before he can realize the highest market prices for his crops. This is an essential feature with the fruit grower.

It may be fairly asked why I should attempt to write on "Pear Culture," a subject that has been so frequently and so ably discussed by so many distinguished pomologists. My answer is simply this: that although I may not throw such light on the subject, physiologically, still I have the same love for the art that they have had, and I feel that my practical experience in the orchard may be of some value to the uninitiated who may embark in the business of pear culture, either for pleasure or profit.

PEAR CULTURE
FOR PROFIT.

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CHAPTER I.

VARIETIES.

THERE are comparatively few varieties that are suited to all parts of the country, and unnecessary expense and disappointment have been incurred from the planting of those varieties, which have given entire satisfaction in one locality, while in other places they have failed to give good results. This is owing to several causes, and in some instances, is almost unaccountable ; but in most cases, the differences of climate, exposure and soil, bear a marked effect on the quality and productiveness of the tree. The thorough preparation of the soil before planting, has a great deal to do with the future welfare of the tree. This is more especially true of clay soils, retentive of moisture. Under-draining is necessary in such situations.

To remedy the injurious effects and prevent a continuance of this needless expense to the planter, should be sufficient inducements for establishing horticultural societies in every town ; these societies to co-operate with each other through the medium of County, State and National Pomological Societies. In this way more useful and definite information would soon be obtained. The town societies should discuss freely at their meetings the merits and demerits of the different varieties, and their adaptability to certain localities. A very complete list of kinds suited to particular localities and climates, could soon be arrived at. This would, in the course of a few years, enable parties to make a better selection of fruit, and much uncertainty that now exists would be avoided. There has been much accomplished by a few energetic societies, but there is still a wide field for improvement. I am constantly asked : " What kinds shall I plant for table use, and what kinds for market ? " These are difficult questions to answer, when it is well known that we have only a few varieties that succeed well in all localities. The Bartlett, Duchesse d'Angoulême, Seckel and Vicar of Winkfield, with a few others, are favorably known in nearly every locality, and do well in most situations ; but people want a more extended list of varieties, and in many cases they have repented of

increasing their number beyond six kinds. I can speak from experience on this point, and I freely confess that my desire to have fifty varieties, instead of six, for market purposes, has been a loss to me of several thousand dollars. The Flemish Beauty, that does so well in many parts of the Eastern States, in the clay soils of New Jersey, is unworthy of a place among the list for market. The same is true of Easter Beurré, Beurré Diel, Swan's Orange and Louise bonne de Jersey, and a host of other varieties, that a few years ago were considered profitable market kinds, still I am compelled to abandon their culture, owing to their unreliability in the orchard. Again, a person, before selecting his list of varieties, should consult the fruit merchant, and learn of him the kinds that are in demand. For instance, the Belle Lucrative, a variety that I consider second to none, in vigor of growth, productiveness and quality of fruit, is quite unsaleable in the New York market, because it is not known to consumers. For the past three years I have sold them for less than half what Bartletts brought, although in quality the latter are much inferior on our soil.

The horticultural societies throughout the country have done and are doing great injustice to the public by offering large premiums for the greatest number of varieties, and then permitting those to be

included which, for years, have been discarded as worthless for amateur or market purposes. Persons not familiar with the different varieties, seeing these on the show-table, are quite as likely to purchase them, as they are those which have been fully tested and found worthy of cultivation. Why this practice of putting poor kinds on the table is permitted to go on, year after year, I cannot tell, although every one conversant with fruit will admit it is wrong, and calculated to lead the public astray in making selections. For some years the Pennsylvania Horticultural Society has followed a far better system, in the manner of awarding its premiums. At its regular exhibitions, premiums are offered for single plates of approved kinds, instead of foolishly throwing away money, and misleading the public, by offering sums for collections. By this simple method, practical growers are brought into fair competition with other growers, and he who is in search of information, can get at facts valuable to him as a beginner. I am glad that many other societies are adopting this plan, and ere long, it is to be hoped, the system will become general.

CHAPTER II.

ASPECT.

VARIOUS opinions are held concerning the most appropriate site for a pear orchard. Many, believing that they avoid the danger of late or Spring frosts injuring the blossoms, prefer a northern exposure. Others choose a southern or south-western exposure. My own opinion, founded on long experience, is in favor of a north-eastern aspect, on rising ground. There is but little to be feared from late frost on high or rising ground, and it is quite unusual to have a severe frost when the pear is in blossom.

At our farm, near Newark, New Jersey, it has only occurred once in fifteen years. On the night of the second of May, 1863, a frost destroyed nine-tenths of the blossoms, only a few Winter varieties that were not fully open, escaped injury.

I find that it is a good plan to mulch the ground around the body of the pear tree, late in the fall, with salt hay, straw, or other litter. It not only keeps the frost in later, retarding the buds from swelling before the weather is settled, but also prevents

the alternate freezing and thawing, that prove so fatal to young trees in many sections of the West. There is no advantage in ripening pears early; in fact, there is a disadvantage, for, if the Bartlett and Belle Lucrative are on a southern exposure, they are ready for market at a time when peaches and blackberries are in abundance, and, as a matter of course, they have to be sold at a much lower price than when peaches and berries are disappearing. This is also true of the Duchesse d'Angoulême. In the early part of October, pears of this variety frequently sell from \$8 to \$12 per barrel, while in November, prices advance, and it is not unusual to get from \$20 to \$30 per barrel for the same quality of fruit.

To shelter an orchard from the prevailing wind, is often more important even than the aspect; for pear trees, especially when heavily laden with fruit and exposed to a wind storm, will suffer more injury from being shaken, than from an ordinary late frost. When the location is selected, if no natural protection exists, it is better to plant rows of some rapid growing evergreens—such as the White Pine, Norway Spruce, or American Arbor Vitæ—every twentieth row, close enough to form a complete hedge in a few years. This will prove ornamental and useful. The evergreens should be planted in lines parallel with the pear rows, and they will more than pay for

the ground they occupy in protecting the fruit trees from heavy gales.

To carry out this plan, in a more profitable way, I have planted a row of the *Beurré d'Amalis* pears, a strong growing variety, four feet apart, for the purpose of forming a hedge or screen. It has answered a double purpose, yielding a crop of fruit and also protecting the trees in the orchard, for some distance south-east of it, from the wind storms. I am very well pleased with the result so far. The young shoots were interlaced each year, and in five years from the time of planting, they formed a barrier seven feet high, besides giving an average crop of fruit for the past three years.

Another, and an excellent plan for protecting the trees in the orchard, is to plant a row of peach trees, ten feet apart, in the most exposed part. The peach is a rapid grower, and for four or five years will serve a good purpose, when they can be removed and another row planted in another position. I have had enough fruit, in this way, to pay the expense of buying the trees and labor incident to planting.

CHAPTER III.

PREPARATION OF THE SOIL.

A thorough preparation of the soil before planting is positively necessary, to insure success with the pear, and until the soil is in a condition to allow the "rains and dews to enter, pass through and out of it," in as short a time as possible, the cultivation of fruit cannot be brought to the highest point of profit.

On clay lands, or sandy soil with a retentive sub-soil, under-draining is the first step towards accomplishing the right condition. This should be done at least a year before the trees are planted. There is a prevalent opinion in the minds of many farmers, that under-drains are only wanted to carry off the excess water; but this is only one of their offices. Another, and very important one, is to aerate the soil; in other words, the drains open the way for the atmosphere to circulate freely through the soil, carrying with it gases which cause many chemical changes to take place that will benefit the growing plants. At the present cost of labor and material, under-draining will prove to be an expensive operation, but

it should be remembered, that when a tree is planted, it is not for a crop of one year alone. When the soil is properly prepared before the trees are put into place, annual crops for a lifetime may be realized with little care or expense. For the amateur, or one who only plants in his garden enough for family use, and who will take pride in having his trees do well and bear fine specimens, the preparatory step of draining should not be overlooked.

In case the land selected for the orchard or fruit garden is a heavy clay, locate the drains forty feet apart and four feet deep, if fall enough can be had to carry off the water. If circumstances will admit, it is better to have them at least this depth, for if shallow, the roots of the trees may penetrate, and very soon render them useless.

In the field, the expense of opening drains may be lessened one-third, by loosening the upper two feet of earth with the lifting sub-soil plow. This may be readily done with a pair of oxen or horses; for the former make a long yoke, so that one of the animals can walk on either side of the ditch. When the plow has been run three or four times in the same line, the loose earth is shoveled out, and the operation of the plow repeated in the bottom, until its full depth is reached. A few inches more earth may be loosened by fastening a heavy weight at the

end of the beam. This will have a tendency to keep the point of the plow down, and a greater depth can be attained. The lower two feet will have to be removed by the spade, shovel and pickaxe. The ditch should only be opened a sufficient width to permit the man to work; keeping a gradual slope downwards, and at the bottom only wide enough to admit the tile.

Round pipes with collars are preferable, especially if the sub-soil is sandy. In localities where these cannot be had, the two-inch sole tiles are the second best shape for all lateral drains. When the ditch is completed, the bottom having the requisite fall to carry off the water, commence laying the tiles in the upper end of the drain. The joints should be brought close together, and it is better to place an inverted sod over each joint, or else a small quantity of hay or straw twisted. This prevents sand or fine silt from entering until the earth above the pipes becomes settled. Care should be taken that each tile has a firm position, if not, when the earth is placed on the top of it, the pipe will tilt to one side or the other, and cause a serious break in the drain. The tiles should then be covered with earth, at first carefully with a long-handled shovel, so as not to displace them, and the balance with a plow, road-scraper, or anything else that will facilitate the operation.

When the drains are completed, the soil should be thoroughly plowed and sub-soiled. It is said that the latter operation is a master key to under-draining, and there is no doubt, in my mind, of the truth of it. The usual method is: first, surface plow, following in the bottom of the furrow with a sub-soil plow, drawn by one or two pairs of oxen or horses. The former are considered best, if the ground is very hard or stony. To make the operation very thorough, the field should have the same treatment crosswise, and by this the whole of the sub-soil will be loosened, so that rain and dew can easily percolate to a great depth. As a matter of course, this method will, with the addition of some fertilizer, render the "basement story of the farm" congenial to the roots of growing trees. In the garden, the manipulation of the surface and sub-soil will have to be done with the digging fork and spade, but the space of ground sufficient to supply a family with fruit, is so small, that the expense of disturbing it to the depth of fourteen to eighteen inches will be only a trifle, considering the influence it will have on the growth and vigor of the tree.

A neighbor, who has had considerable experience in draining, instead of tiles, makes use of common hemlock boards, six inches wide, nailed together in

lengths of twelve feet, in the shape of the letter A. He finds they are quite as effective as tiles, and more easily placed in the drain. He put some down in 1848, and they are at present perfectly sound. My practice is to under-drain during the summer, then fall plow and sub-soil, leaving the land in ridges during the winter. In the spring, when the ground is dry enough to work, surface plow, running the lifting sub-soil plow in the bottom of the furrow. This latter operation, with the effects on the soil of the alternate freezing and thawing during the winter months, leaves the soil in fine mechanical condition. The land is then made ready for a root crop, usually potatoes, which are planted in the ordinary way, the rows wide enough apart to admit of horse implements. Before planting, I apply to the surface broadcast five or six hundred pounds of super-phosphate to the acre, and harrow it in, and put wood-ashes into the drill at the time of planting. The surface should be kept loose and free from weeds, by frequent disturbance of the surface soil with the horse-hoe.

When the crop is harvested, the land will be in excellent condition for setting out trees, which may be done in the fall or the following spring, as circumstances may dictate.

Persons desirous of knowing more about under-

draining, are referred to books published on the subject.

On light sandy soils, having an open sub-soil, fruit trees will thrive without under-drains, provided the land is kept in good "heart," and thoroughly worked before planting the trees. Land that will produce forty or fifty bushels of shelled corn to the acre, prepared in the way described, will give satisfactory returns in pears, and produce new wood enough to sustain the tree in a healthy condition. When a young pear tree is heavily laden with fruit, and has no new wood, it is fair to suppose that the tree is not in a healthy state. This is subsequently proved by the fact, that this over-bearing has brought on premature death. Pear culture is frequently condemned as being unprofitable, and the trees short-lived, when the facts show mismanagement on the part of the owner in neglecting to provide the necessary food, and an entire want of knowledge of the principles that should govern the use of the pruning knife.

CHAPTER IV.

DISTANCE APART IN PLANTING.

THIS is an important subject for the person who intends to plant fruit trees. Once in place, it is very difficult and expensive to remove them, besides, there is always some risk in transplanting a large tree. When a mistake has been made in the laying out of a young orchard, the owner must quietly submit to the error, and the only satisfaction he can have, is to prevent others from making the same mistake.

The distance apart that trees should be planted in the orchard, depends somewhat on the mode of pruning to be adopted, and the use to be made of the ground between the rows. In case the trees are trained tall, with spreading tops, the distance, both between the rows and the trees in the row, must be more than if the conical shape is chosen.

Standards pruned to make pyramids, may be planted as close as 12 by 16—that is, twelve feet apart in the row, and sixteen between the rows. With a careful and judicious system of pruning,

(which will be described under another heading), this will be found ample room for standards. We have standard trees, set out thirteen years ago, on well prepared soil, at these distances, and I am convinced they have plenty of room for all purposes.

Dwarfs require less room than standards. Our first plantings were set 8 by 21, but we found that too great a distance between the rows, and at each successive planting we reduced it, until we got down to 10 by 10, which, on strong ground, is as close together as they ought to be planted. We have decided that all our future plantings of dwarfs, shall be set at these distances. In pursuing this course, every tenth space is left fifteen feet wide. This is necessary in an orchard, so as to permit a cart to pass between the rows in manuring the trees, gathering the fruit, &c., &c. By planting both standards and dwarfs according to the following diagram, each tree has more room than if placed directly opposite the other.



When the trees are planted at these distances, vegetables may be grown between the rows for a few years, sufficient at least to pay current expenses, that is, rent of land, taxes, labor, &c., &c.

This can readily be done, in locations where land is high, without material injury to the trees, provided enough manure is applied to perfect the growing crop. Potatoes, carrots, beets, onions and turnips, are the kinds least likely to harm the trees. Strawberries, when permitted to make runners and cover the whole surface, are quite as likely to retard the growth of trees as any of the cereals. The latter, on no account, should be sown on a young orchard. I know of some instances when two-thirds of the trees were stunted by one crop of rye.

When the location is within a short distance of a good market, in the vicinity of any of our large cities, currants may be planted three and a half feet apart, and midway between the pear rows. We have followed this plan for a number of years, and have made it pay a handsome profit. When the trees attain size enough to require all the ground, it is an easy task to remove the currant bushes. For the last seven years, our currants growing between the pear rows, averaged annually \$117 per acre net.

This fruit is becoming more popular every year, and in the neighborhood of New York, the demand

has been far greater than the supply. This berry may also be made into a jelly, which is always in demand.

I mention these facts, as there are many persons planting small lots of pear trees, in locations where land is high, and they want something growing between the trees that will pay expenses.

At the end of five or six years from the time of planting the trees, cropping between the rows or in the orchard should be discontinued. At the expiration of that time, a cultivator or horse hoe will be quite sufficient to disturb the surface two or three inches deep. This operation should be repeated often enough to keep the soil loose and weeds from appearing. Pains should be taken to carry out this latter fully, as the weeds are both unsightly and unprofitable in an orchard of any kind of fruit.

If the trees receive the proper care and treatment, the crop of fruit will be large enough, by the sixth and seventh years, to begin paying some of the original outlay for trees, and the expenses incurred in preparing the soil.

DISTANCE TABLE FOR PLANTING.

Feet.	Feet.	Number of trees to an acre.
10 by	10.....	435
12 “	12.....	302
12 “	16.....	226
15 “	15.....	193
18 “	18.....	134
20 “	20.....	108
25 “	25.....	69
40 “	40.....	27

I give no figures about the cost of planting an acre of pears, because, with the facts set forth in this work about the way land should be prepared, any person can readily calculate what the outlay will be.

CHAPTER V.

DWARFS AND STANDARDS.—SELECTING TREES.

AFTER fourteen years of practical experience with pears and their culture, having had under my charge, part of that time, more than one hundred varieties, including all the leading kinds, planted on well prepared soil,—I have come to the conclusion, contrary to my former views, that with a single exception, the culture of the dwarf in the orchard is a failure. This conclusion is not the result of a few days' investigation, it has extended over many years. As fact after fact presented itself, I was slow to accept them as conclusive, until it became so apparent, that to hold out any longer would be obstinacy. For a long time, I had reason to suppose that the Angers quince was well suited as a stock for many of our best varieties of pears, but as far as my personal observation has gone, the number has dwindled down to one variety, that is the Duchesse d'Angoulême. How long this kind will continue to do well on quince root, I am not prepared to say. If it should fail, I would feel much discouraged, for I

have met with but little success in growing this variety as a standard. All other kinds that we have under culture do better as standards. By a simple and judicious system of pruning, I find little difficulty in bringing them into bearing the fourth or fifth year from the time of planting. Nor is the fruit inferior in quality on our soil, although specimens of the same variety are frequently larger on the dwarf than on the standard.

The majority of our Duchesse d'Angoulême trees have become standards by pushing out roots from the pear stocks, but they are more profitable than when planted on pear roots. The standard Duchesse, or those originally having pear roots, that we have in the orchard, are less productive, and the fruit is inferior in size and quality.

For many years during our early experience in pear culture, we planted trees in the orchard not less than two years old, believing that younger trees would not do as well. On this point we have changed both opinion and practice, and we now select well-grown, one year old stock, in preference to all others, for the following reasons: trees of this age cost about one-half as much; when planted in the orchard, they will become more uniform in shape and size, with less labor; the purchaser will get more roots in comparison with the tops; and the

freight will not average more than one-quarter, for one hundred one-year old will not occupy more space than twenty-five or thirty two-years old trees.

Persons who are about purchasing fruit trees should in all cases buy of some responsible nurseryman, who has his reputation at stake for what he sells. It is a well known fact among the trade, that a nurseryman who sends out well grown trees, and true to name, will build up a larger business in this way, than by using freely printer's ink.

Do not be induced to buy from peddlers, unless you are certain they are the authorized agents of some well-known nursery. They are, in most cases, supplied with exaggerated and extra colored prints of different kinds of fruit, to tempt those unacquainted with the original. Many of these persons represent themselves as the agents of responsible nurseries, with whom, in fact, they have no connection. It would be to the interest of all to suppress this traffic; it not only cheats the public, but it does great injury to the business. If the nursery is not too far distant, it is the best plan to go there in person, examine and select what you want. Point out a specimen of the size and shape wanted. In making such a selection, the price may be a little higher, but you can afford to pay a few cents advance on the regular price for a tree that is well

grown and stocky. It is but a small item, when you consider the difference it will make in the orchard in the course of ten years. In case you decide to have part dwarfs, do not buy those that are high worked. If buyers were more careful, and refused to take trees when the pear bud has been set six or eight inches above the surface, nurserymen would soon abandon this practice, which is now too prevalent. It is less labor to set a bud six inches from the ground than two, because the operator does not have to lean over so far; but if those high worked trees were unsaleable, proprietors would pay more attention to this branch of the business than they now do. It is well known to all intelligent fruit growers, that in planting dwarf pear trees, the union between the pear and quince should be at least four inches below the surface. In case this rule is carried out with a tree “high worked,” say five to eight inches above the surface, the roots are buried so deeply, as to be out of the reach of the effects of the sun’s rays, and the free circulation of air; both of which are so important to assist in the healthy growth of the young tree.

For either standards or dwarfs select low trained, stocky trees, even if you decide to remove the lower branches after they are in place. I have found, from experience, that such trees are better

rooted, and they will, in nine cases out of ten, succeed best in the orchard. But strange as it may appear, four persons out of six will choose a tall spindling tree in preference to a stocky one, and, therefore, nurserymen are compelled to train trees to suit the market, instead of what their experience and judgment would dictate. Some of the practical ones do exclaim, when coming into a nursery, "Why don't you have those trees more stocky? They are too tall to suit me!" The simple reason is, nurserymen like other producing agents, will raise what their customers want. If it were a matter left to their judgment, we should have more well grown and healthy pear orchards than are now to be found.

Trees that have been forced too much in the nursery row, as a general thing, do not succeed as well as trees grown on land of medium strength. As a case in point, we imported from France, six years ago, one thousand Bartletts, two years from the bud. Everybody who saw them, said they were, without doubt, the finest lot they had seen. The second year's growth averaged four feet long, and the young wood looked as if it might be made into serviceable walking canes. These trees were planted on a clay soil, well prepared and in good condition. It would have produced three tons of timothy hay to the acre, or fifty bushels of shelled corn.

After planting, the trees were cut back and great care taken of them. In two years from the time of planting, three hundred and twenty-four died. The only solution I can give, is, that they were stimulated to such an extent in the nursery, that when transplanted into an ordinary soil, the roots did not supply the amount necessary to keep the top in its unnatural condition. On close examination of the young wood, I found it to be soft and spongy. I have no doubt, that forcing trees with putrescent manures is the cause of the numerous cases from which young trees suffer for two or three years after being set out. I do not mean to say you should select stunted trees, but such as have a healthy appearance, with a moderate growth of young wood, if, on examination, you find it hard to the extreme ends of the branches. You will often find, on cutting the young wood of trees that have been forced too rapidly, a dark brown spot in the center or heart of the twig; this is a sure indication of an unnatural growth, and great care will have to be given, or many of the trees will not survive more than one or two years. The best remedy for this is to cut off at least two-thirds of the previous year's growth, and mulch the ground for a space of three feet around the body of the trees.

The aphid, or what is commonly called the bark

louse, often finds its way into the nursery, and unless the necessary precaution is taken, it will spread rapidly. Purchasers should be careful to give instructions that no trees so affected, should be sent to them, for, until these little insects are removed, the trees will make but small headway in the young orchard.

CHAPTER VI.

TIME OF PLANTING.

WHEN the ground has been thoroughly prepared, by under-draining, surface and sub-soil plowing, in the way described in the former part of this treatise, so that the land will not hold stagnant water, pear trees may be planted with safety, either in the spring or fall, as time and circumstances may permit. If everything is in readiness, and it is decided to plant in the fall, the trees may be removed from the nursery row as soon as the leaves are shed, or the leaf-buds fully developed. The labor of planting may be continued, if the ground is dry enough to work, until severe frost stops the operation. It is a very wise plan to mulch trees planted in the fall with hay, straw, long manure, or charcoal cinders. This light covering of the ground as far as the roots extend, prevents the frequent freezings and thawings, which often prove so injurious to the roots of newly-planted trees.

Some fruit-growers object to fall planting, on account of the trees being left so long exposed to the

winter and spring winds before growth commences. This, of course, would be a serious objection, if the trees were planted carelessly, and left unprotected until the following spring. The swaying of the top backward and forward would, without doubt, injure the roots. But in every case, the trees should be carefully planted and pruned, or cut back at once. Then there is little to be feared from the injurious effects of the wind, on trees planted in the fall.

In our pear orchard of several thousand trees, about one-half was set out in the fall, and the other in the spring, and, except in a few cases, there is little noticeable difference. My rule is, to begin work just as soon as the ground is in readiness. Five years ago, I selected sixty trees, and planted one row (thirty) in the fall, the balance in another row, in the spring, for the purpose of experimenting and convincing myself if there would be any difference in the growth of the trees, provided the condition of soil and the trees were alike. Since then, both of these rows have had the same treatment, receiving the same kind and quantity of manure, and being pruned at the same season. The first season, the row planted in the fall was ahead, the young wood was stronger and the general appearance better. But the second year, the spring row caught up, and there is no perceptible difference to-day in the state

of the two rows; they are as nearly alike as pear trees can possibly be.

This experiment, in connection with some others, of which I have kept a strict record, convinced me that more depends on the condition of the tree, and the thorough preparation of the soil, than on the time of planting.

There is one fact that I have noticed in many cases. When trees are planted in the fall, the work is performed better, all the rules laid down by practical men, who have given written directions on the subject, are more fully carried out. This is, probably, because persons are not so much hurried with other work at this season as in the spring, when everything has to be attended to in a short space of time. For this reason, I have frequently recommended fall planting in preference to spring. I know how important it is that a pear tree should be planted with the greatest care, to insure future success.

Trees may be set out in the spring, as soon as the ground is in a condition to be worked, and until the leaf-buds are partially unfolded. I have frequently transplanted pear trees when in full leaf without the loss of a single tree. This can only be done by very careful handling, severe pruning, and mulching the ground soon after the trees are put

into place. Trees should never be planted, either in spring or fall, while the ground is wet, for if the earth is thrown around the roots in this condition, it will form into lumps, and will remain so for years, which will interfere with the growth of the young roots. This is more especially true of clay soils, or sandy soils with a clay sub soil.

CHAPTER VII.

PLANTING.*

WHEN the location of the rows intended for pear trees is decided upon, run a large sized sub-soil plow a dozen or more times, repeating until the soil two or three yards on either side of the center line is completely pulverized. This operation will leave the soil in fine condition for the roots to penetrate and lessen the expense of opening the holes, as there will be but little left to be done with the spade.

Various opinions are held by growers, concerning the proper size to which the holes should be dug, in putting out trees; but from my own experience, the most satisfactory results have been obtained when the field or garden has been *one large hole* filled loosely with fine earth.

In removing the earth from the holes, keep the surface and the sub-soil in separate heaps. When the proper depth has been attained, which should not be less than two feet, and at least three in diameter, fill the hole with surface soil to within twelve or eighteen inches of the surface. Mix with this

earth finely-ground bones, super-phosphate and wood ashes; a small quantity of each will answer the purpose, provided the ground is of average quality, that is, of sufficient strength to produce forty or fifty bushels of shelled corn to the acre. Before putting the tree into place, examine the roots carefully, and if there are any broken or bruised remove them; using a sharp knife and cutting them from the under side.

All fruit growers are aware of the fact, that pear trees in the nursery row throw out stronger branches towards the next row than towards the next tree in the same row. The future equilibrium of the trees will therefore depend in part on the weaker portions being preserved as above described.

Dwarf pears should be placed in the soil, so that at least four inches of the pear stalk will be covered; or in other words, the union between the pear and the quince should be four inches below the surface. This will insure the early bearing of pears worked on quince, and the pear stalk will, in the course of a few years, push forth roots changing the tree into a standard. Some varieties do not readily root from their own stock. In such cases I have removed the earth from around the body, and with a sharp knife slit the bark open lengthwise in three or four different places, and then restored the earth. This is

almost a sure way of forcing roots from the pear above the union; and from twenty-five such incisions that I made three years ago, I found recently, on removing the trees, twelve healthy pear roots, formed in that time.

When dwarfs are planted in the way described, they will succeed much better than if the union is at or above the surface. Standards, or pears worked on their own stock, should not be planted more than four inches deeper than they stood in the nursery. The pear root is more fleshy with less small roots than the quince, and therefore great care should be taken, both in "lifting" from the nursery row and in transplanting. On no account should the roots be left exposed, either to the sun or to a strong wind.

When the tree is in place and at the proper depth, fill in around the roots with surface soil. One man should hold the tree in position, while one or more assist in putting the earth around the roots, each of which should be drawn out to its full length and at right angles with the body of the tree. Too much care cannot be given to this branch of the work, for it is all important that the roots should be surrounded by fine earth and placed in a natural position. Each layer of roots should be held up until the earth is up to its level, then stretch it out,

and so continue till the hole is filled. The tree should be gently shaken occasionally, so as to settle the soil around the roots. It will be necessary to raise a mound of earth around the body of the tree, four or five inches above the level of the surface, to allow for the settling of the soil. Then press the earth firmly around the body of the tree with the foot, to give the tree a firm hold.

Trees that have been out of the ground for a long time, and suffered from exposure or careless packing, I have frequently saved by immersing the roots, for two or three hours before planting, in water, to which I have added a small quantity of finely powdered bone or super-phosphate of lime.

CHAPTER VIII.

DIGGING TREES FROM THE NURSERY ROW, AND PACKING.

THERE is no branch of the nurseryman's business that requires more care and attention than removing young trees from the nursery row. On the judicious performance of, this very delicate operation depends to a great extent the future success or failure of the pear orchard. From practical experience for the past fifteen years in buying fruit trees, I feel confident in saying there is less care exercised in this department than in any other connected with the nursery. As a general rule (of course there are some exceptions), the labor of "lifting trees" is performed by strength and ignorance. The men who are employed for this kind of work care but little if a third or even one-half of the roots should be detached from the tree by careless and rude means, so long as the required number of trees is dug out. The method practised in many nurseries is: one man on each side of the row of trees with an obedient spade in hand, while a third man takes hold of the top of

the tree that is to be removed. This is a signal for the men with spades, who push them into the ground, face of the tool towards the tree, so, with the combined efforts of two men prying and one pulling, the unfortunate tree is jerked from its habitation, leaving, as may be supposed, a large portion of the most valuable roots in the soil. In fact, it is difficult to be severe enough against this barbarous method, so common in lifting young trees. If the soil is a heavy clay, the roots are more broken and lacerated than if in a sandy loam. The clay being more compact, the young roots are severed by sudden jerking or rough handling.

Figures Nos. 1 and 2 are correct drawings from trees grown in the same row, having had the same treatment previous to removal. Fig. 1 was taken from the nursery in the way described above. There can be no doubt in the mind of any person examining the two, as to which one he would select for planting, provided he had the choice, and it is also quite certain No. 2 will make the better tree, having sufficient roots to furnish the top with food enough to keep it in a healthy condition, until more roots can be made. But, except under the most favorable circumstances and with great care, No. 1 will not survive one year; if it does, the tree will merely hold on to life. The top of such a tree should be

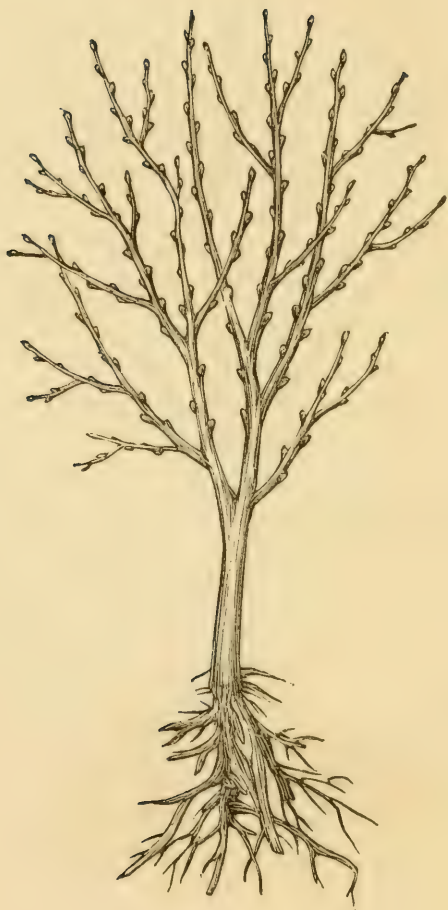


FIG. 1.



FIG. 2.

pruned severely, cutting off two-thirds of the present growth, and then the ground should be mulched heavily, so as to keep the soil around the roots moist.

In most instances that have come under my observation, nurserymen are in fault, in lowering their prices in order to draw more custom, and then being often compelled to engage ignorant and cheap labor to perform the work.

The strictest care should be exercised in removing trees, and price enough be charged, so that purchasers may get all the roots as well as the tops. The men should commence digging one and a half to two feet from the tree, opening a trench parallel to the row of trees, always keeping the edge of the spade towards the body of the tree. When the bottom of the trench is below the roots, a digging fork should be used to remove a portion of the ball of earth from around the roots. The spades may then be pushed under this ball, and by a gentle and continuous pulling the tree will readily be lifted with all its roots. If the tree is to be transplanted near by, the earth may be left on, but if it is going some distance from the nursery, the earth must be shaken off in such a way that the roots may not be injured. Trees should be placed under cover as soon as they are dug out, and the roots protected from

the wind and sun until packed for transportation. In a large nursery, it is not an unusual thing to see trees left lying on the ground without protection for several hours, before being taken to the packing house. This should not be permitted, for both wind and sun injure the young roots.

PACKING TREES.

It is a strange thing, but nevertheless true, that nearly all purchasers object to have a charge for packing added to their bills. This certainly ought not to be the case. The nurseryman sells his trees at so much per hundred or thousand, and puts down the prices so low that he cannot afford to pay for boxes and material, all of which the purchasers get and can make use of in some other way. If the trees have to go a long distance, it is always safer to instruct the nurseryman to use well-made boxes and pack a sufficient quantity of moss among the roots to keep them moist. For short transportation, the tops may be bound in straw to protect them from injury, the roots covered with moss, and coarse bagging carefully fastened on with very strong cord, such as is used for baling hay. The nurseryman should also be instructed whether to forward the packages by railroad, steamboat, or express, also naming the line. A neglect in giving these direc-

tions oftentimes is the cause of much delay and disappointment. When the trees arrive at their destination, the boxes or bundles should be opened at once, the trees carefully lifted out, the roots wet, and the trees "heeled in," that is, put into a trench two feet wide, eighteen inches deep, and any desired length. The trees must be placed in this trench in an upright position, as closely as they will stand, and the fine earth filled in around the roots, covering also six or eight inches of the body of the trees. They may be left in this way with safety until the ground is made ready for planting. If the roots look very dry on taking them from the boxes, they may be placed in a stream of water for twelve to thirty-six hours before planting. I have frequently appealed to this practice with imported trees that were a long time on their way, and in most cases have been successful in saving the life of trees so treated.

CHAPTER IX.

VARIETIES TO PLANT.

To select the best varieties to plant in the orchard is always a puzzling task for the beginner, especially if he is in a location where there have been few pear trees planted. There are not many sorts that do well in all parts of the country; such is the influence of soil and climate on pears, that the same varieties often differ in quality and productiveness in different parts of the same State. Persons cannot always be guided in making a selection by ascertaining the kinds that have been fully tested in other parts of the State, unless the soil and climate are alike. Even with such varieties as the Bartlett, Duchesse d'Angoulême, Seckel and Vicar of Winkfield, which succeed in most localities, I have frequently witnessed so marked a difference in their appearance and quality, as for a time to doubt whether they were not other sorts. The great difficulty in making a judicious assortment is, that there are too many varieties from which to choose.

If a person consults books on the subject, or

nurserymen's catalogues of fruit trees, he becomes bewildered by the multiplicity of sorts minutely described and recommended for cultivation. Then if he decides to attend some horticultural exhibition, and make the selection from the choice kinds on the tables, the same perplexity arises, how to select five or ten varieties from these large collections. In most cases the specimens on exhibition average one-third larger in size than the main crop, in this way misleading persons not very familiar with fruits. In our own case, if we had confined our selection to five good varieties, instead of fifty, we should be several thousand dollars better off to-day, and have besides a uniformity in the appearance of the trees of our first plantings. In another instance that has come under my observation, the proprietor of an orchard of fifteen hundred trees informed me that it had made a difference in his receipts of three thousand dollars in ten years.

At the request of different persons he was persuaded to set out ten trees of one kind, fifteen of another, five more of something new and choice, and twenty of another sort. So he kept on, until when the fifteen hundred trees were in place, he had over fifty varieties. As the trees came into bearing, many of the sorts proved to be nearly worthless for market purposes. Having so many varieties, only a

few of them were in sufficient quantity to make it an object to send them to market. At the expiration of ten years two-thirds of the original fifteen hundred trees had to be re-grafted.

It is much less trouble and more profitable to dispose of one hundred barrels of any one well-known variety than to sell ten barrels of ten different varieties. In an orchard of five hundred trees, I would not have less than one hundred of the same kind. As a matter of course, before deciding, I would endeavor to make myself familiar with the varieties that will most likely do well in the locality. In making selections for the orchard, preference should always be given to trees whose natural habits are vigorous, for strength, combined with productiveness and good quality, and adaptation to soil and climate, are the requirements we need. There are many choice kinds of pears on our catalogues that are rendered unfit for the orchard, by their habit of growth being so irregular and uncertain. This peculiarity, and an inclination to overbear while young, should deter purchasers from planting largely of such varieties in the orchard, and therefore inquiry should always be made on these points before selecting. It makes little difference to the orchardist what the quality of the pear may be; if the tree is a poor grower, it becomes an unsightly object in

the orchard. I am frequently asked, by persons about to engage in pear culture, "What kinds shall I plant for market purposes?" My reply in most cases has been: "First, make inquiry of persons living near your location, to learn if possible which kinds succeed best, and then confine your list to a very limited number of varieties."

I cannot even now make out a list of varieties that would be a safe guide to others located in a different part of the country. There are so many contingencies, that if I prepared one, it would more probably mislead than instruct them. Our experience for the past fifteen years in growing pears for the New York market, has caused a reduction in our list of fifty varieties to the following named sorts, all of which succeed well and command the highest market prices.

EARLY.

Bartlett.	Doyenné Boussock.
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FALL.

Duchesse d'Angoulême.	Beurré Clairgeau.	Seckel.
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WINTER.

Beurré d'Anjou.	Lawrence.	Vicar of Winkfield.
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All of these we plant as standards, except the Duchesse d'Angoulême, which we still cultivate on quince roots.

Pears ripening before the Bartlett with us have

not been profitable, owing to the fact that they come into market at a time when there is an abundance of small fruits, and the demand for pears is therefore comparatively trifling. Many of our early varieties were grafted with later kinds some years ago, and I have no reason to regret having done so. Thus far there is *no* first quality, late winter, market variety that I can recommend for the orchard.

The Bartlett is so well known in every part of the country, that it needs no description. It is an excellent market variety, when grown as a standard.

The Doyenné Boussock is not so well known nor so extensively cultivated. It is, however, gaining favor every year, and with us, it is a profitable variety for market. The tree is a very strong grower, bears a large showy pear of fair quality, and always sells readily at the highest market prices. Its time of ripening is the same as the Bartlett.

The Duchesse d'Angoulême is about as well known as the Bartlett, although it is not quite as reliable a bearer in all localities. With us, it is the most profitable variety that we cultivate for market. Two-thirds of the pear trees in our orchard are Duchesse d'Angoulême. It is a vigorous, upright grower; it will succeed best under what is known as "high culture." The fruit with us is large, uniform in size, and of good quality. The tree seldom

fails to produce a crop of fruit. It ripens in October and November.

The Seckel is a recognized favorite throughout the country. Its quality is unquestionable. The drawback to its culture for market is on account of its size and tardiness in coming into bearing. The tree must have age before any money can be realized from the Seckel. A list made up without this pear would be incomplete. In setting out an orchard, I would have but a comparatively small number of Seckels; in fact, I would much prefer grafting large trees of poor kinds with this variety than planting stock as it comes from the nursery.

Beurré Clairgeau is a large and very showy pear, commanding a higher market price than any other variety ripening at the same time. We are cultivating this variety in the orchard, but I am still uncertain whether it will come up to the standard of a reliable kind for market. The difficulty is, that in certain seasons the tree sheds its leaves during the month of August, and the fruit, before gathering time, is almost entirely covered with small black spots, which make it unsightly. In a few instances, I have known the fruit to be cracked. It has not done so on our soil. When Duchesse d'Angoulêmes are selling for \$20, the Clairgeau, well grown will bring \$30 per barrel.

Beurré d'Anjou may be termed an early winter variety, that, like the Doyenné Boussock, is rapidly becoming a favorite among fruit growers. It requires some time for the tree to come into bearing, but when it does, it bears regular crops of fine large pears, of good quality, that bring high prices in market. In our orchard, the tree is a moderate grower. It has borne only a few specimens until the trees were twelve years old; since then they have become more fruitful each succeeding year.

The Lawrence is a medium to small variety, the fruit maturing about the same time as the Beurré d'Anjou. The tree is an irregular grower, sending forth branches in every conceivable direction, and bearing lightly while it is young. Unlike the Bartlett, it is an excellent keeping variety; I have frequently had a Lawrence pear in a good condition to be eaten for three weeks.

The Vicar of Winkfield is in most localities very productive, but the fruit is of moderate flavor and sometimes astringent. It might be set down as good, bad, or indifferent. It is, however, one of our best cooking pears. The tree makes a strong, uniform growth, bears early, and, if planted in quantity to sell as a cooking pear, it will pay handsomely.

The Glout Morceau, so strongly recommended and so extensively planted a few years ago, is a

worthless variety in New Jersey. It is the most promising and least productive variety with which I am familiar.

We have more trees of the Duchesse d'Angoulême in our orchard, than of any other variety; next in number is the Bartlett. The others are in about equal proportion. If confined to plant but two varieties for profit, I would choose these two named. For four varieties, I would add Beurré d'Anjou and Vicar of Winkfield; and for six, I would include besides these four, Lawrence and Doyenné Boussock.

AMATEUR'S LIST.

Summer Varieties.

Bloodgood, Manning's Elizabeth, Dearborn's Seedling, Doyenné d'Ete, and Rostiezer.

Fall Varieties.

Andrews, Bartlett, Belle Lucrative, Doyenné Boussock, Duchesse d'Angoulême, Beurré Bose, Seckel, and Sheldon.

Winter Varieties.

Beurré d'Anjou, Danas Hovey, Lawrence, Winter Nelis, and Vicar of Winkfield.

From this list of twenty approved varieties, the amateur may select enough to give him fine pears for table use from July until March.

CHAPTER X.

PRUNING.

It is admitted by all intelligent fruit growers, that on a proper and judicious system of pruning depends the success of a young orchard. But there are others, who suppose that, when the tree is in place, and it has started to grow, care is no longer required; this is not so—if vigorous, fruitful and well shaped trees are wanted. The following truthful statement on the necessity of a system of pruning is from that excellent work, “Barry’s Fruit Garden.” “The idea that our bright American sun and clear atmosphere render pruning an almost unnecessary operation, has not only been inculcated by horticultural writers, but has been acted upon in practice to such an extent, that more than three-fourths of all the bearing fruit trees in the country at this moment, are either lean, misshaped skeletons, or the heads are perfect masses of wood, unable to yield more than one bushel in ten of fruit well matured, colored and ripened. This is actually the case, in what may be called well-managed orchards. Look

at the difference between the fruit produced on young and old trees. The former are open, the fruits are exposed to the sun, therefore they are not only large and perfect, but their skins are smooth, as though they were polished. This ought to teach us something about pruning; but this is only one point. We prune one portion of a tree to reduce its size, and to favor the growth of another and weaker part. We prune a stem, a branch or a shoot to produce ramification of their parts, and thus change and modify the whole form of the tree. We prune to induce fruitfulness and to diminish it. We prune in growing as well as in dormant seasons; and finally we prune both roots and branches. Thus we see that pruning is applied to all parts of the trees at all seasons, and to produce the most opposite results."

From my own experience, and from what I have learned of those who have been engaged in growing pears on the most approved methods, all appear to have come to the conclusion, that the *pyramidal* or *conical* is the best form for standard as well as dwarf pears, for the following reasons:

- 1st. The largest surface is nearest the ground, and therefore less likely to suffer from heavy winds.

- 2d. The fruit is not injured by falling from the tree.

3d. Less surface is shaded with the pyramidal than with higher and more spreading forms of growth.

4th. The trunk is not exposed to the direct rays of the sun, and consequently the flow of sap is not unduly accelerated, as would otherwise be the result.

5th. The fruit spurs are formed on the main branches, near the body of the tree, and of course more weight of fruit can be sustained with less injury to the tree.

6th. Thinning out and gathering the fruit are made easier, and consequently they will be more likely to be attended to at the proper time.

Numerous other advantages might be given, but those mentioned afford sufficient argument in favor of having the head of the tree as near the ground as possible.

One year from the time of budding, the young tree consists of a single upright shoot, with the largest buds at the top. Whether the tree is removed from or left in the nursery row another year, one-half at least of this growth should be cut off. At the close of the second year's growth, the tree will consist of a central or main shoot with numerous side branches. The most vigorous of these are near the upper part of the central shoot, while the

weakest are near the ground. The plan of pruning should then be directed to check in degree the upward flow of sap, so that it may be disseminated in the lower branches, strengthening the weak ones, and developing the dormant buds. Unless these preventive measures are at once taken with trees grown so closely together as in the nursery row, the buds on many of the lower branches will certainly not unfold. When a one or two-years old tree is planted in the garden or orchard, it is a simple and easy matter to change the flow of sap from the top branches to those nearer the ground. But if neglected for several years, it becomes a difficult task, or the mistake is discovered when it is too late to remedy it.

To prune for a pyramidal tree, each branch should be longer than the one immediately above it, and the plan of the operator should be to encourage an upward and outward growth, and always to leave the tree open enough to admit the sun and air, otherwise the fruit near the body of the tree will be misshapen and unmarketable.

If the grower is very anxious to have regularly formed trees, a bud may be inserted, when necessary to fill up a vacant space.

Some varieties, such as the Duchesse d'Angoulême, Flemish Beauty, Urbaniste, Sheldon and Bart-

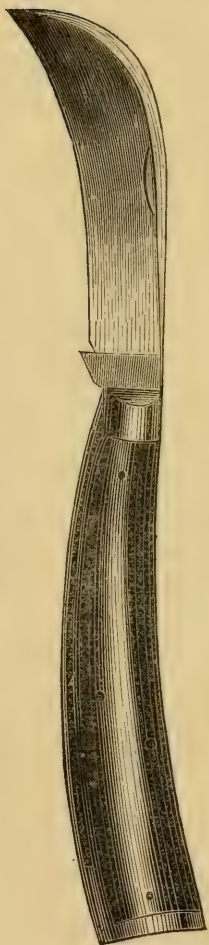


FIG. 3.—PRUNING KNIFE.

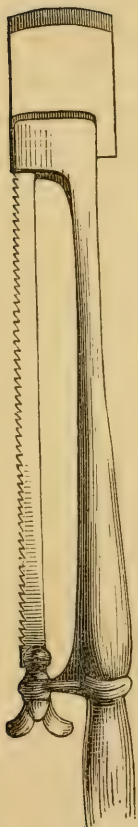


FIG. 4.—PRUNING SAW, WITH CHISEL.

lett are inclined to the pyramidal form; their growth of wood is uniform and regular, and they will therefore attain the proper shape, with but little trouble, unless the young trees were so closely crowded together in the nursery, as to interfere with their natural habits of growth. In such instances more care will be required in planting, and in the first and second pruning, so that the new shoots may be evenly distributed over the body of the tree.

There are other kinds, such as the Winter Nelis, Lawrence and Beurré d'Amalis, more difficult to manage, owing to their propensity to irregular growth. The young shoots on these varieties, are pushed forth in every direction, and to make well-shapen trees of them, they will require strict attention for three or four years from the time of planting.

For the first named sorts, the cut in trimming should be made slanting on the upper side of the shoot, near a wood bud; or in other words, the operator should stand facing the tree, cutting from the upper side, drawing the knife at an angle towards him. The bud in this case must be on the under side of the shoot, so positioned that the growth from the bud will keep the tree in balance. In cutting off branches, the knife should always be very sharp, so that a clean cut may be made, which will heal more quickly than if the end of the twig

is left with a ragged edge. In removing the end of the shoot, care should be exercised to cut it so close that the growth of the bud may be a continuation of the branch. I have sometimes seen the cut made so close to the bud, as to injure it; and then again if

too much wood is left above the bud, the stump of wood decays and makes an unsightly object. Figure 6 represents the proper way to cut off a shoot. If cut as in figure 5, the wood above the bud will decay, and it may reach and injure the bud.

For the latter class of trees, the cutting will depend on the position of the shoots and buds; but as stated before, the growth should be encouraged upward and outward.

If it is necessary to have a shoot go straight up, the bud should be on the inside of the shoot; if on the



FIG. 5. contrary, an opposite or side devi- FIG. 6.

ation is wanted, select a bud pointing in either direction, and with care, the desired end is sure to be accomplished. It may often be requisite to remove a large branch in order to make the tree more open in the center. When this has to be done, the cut

should be made close to the body of the tree or to the branch from which it forks off. The surface of the wound should be made smooth and coated over with gum shellac dissolved in alcohol. I have used this paste for a number of years, with satisfactory results. Owners should not be over-anxious to have a large tree in a few years, but rather endeavor, by a judicious system of pruning, to get a stocky growth, and strengthen the branches near the ground. In this way the whole surface of the tree will produce alike. By pursuing this course, the buds on the lower branches are developed, fruit spurs are formed near the trunk of the tree, and by keeping the branches far enough apart to admit sun and air freely, the fruit will attain full size, and will be less likely to be blown off by heavy gales in the fall than if on the top of the tree.

When the tree is in place, from one-half to two-thirds of the young shoots should be pruned, leaving every branch shorter than the one immediately under it. By strictly following this method, the upward tendency of the sap will be in a degree checked, and there will be a more even distribution of it among the lower limbs. The scripture adage, "train up a child in the way he should go, and when he is old he will not depart from it," is no less true of a fruit tree. It rests solely with the owner, whether

he will have a well-shaped and productive tree, or a misshapen and unproductive one. If during the first summer, one, two or three shoots should be making a stronger growth than the others, pinch them back with the thumb and finger. By giving some attention in this way, a more uniform growth will be obtained.

On dwarfs, fruit will frequently set the fourth year from the time of budding, but it is very unwise to let it remain. The trees should be examined carefully, and every pear removed. By permitting young trees to bear fruit, they are so likely to become stunted, that the owner cannot be urged too strongly not to sanction this dangerous practice, now so common in almost every young pear orchard. The question is frequently asked, "when should pruning be done?" The most appropriate answer to this question is, "*prune in winter for wood and in summer for fruit*;" in other words, to encourage the growth of wood, to build up the tree, the general pruning should be done during March and April, or not until the continued cold weather has past. If young trees are pruned in the early part of winter, the ends of the shoots are often so injured by severe cold weather, that the first leaf buds are killed, leaving short pieces of dead wood to disfigure the branches. On our own place, we begin to prune

from the 1st to the 15th of March, and go on with the work through April. I do not remember a single instance, nor can I find one in my note-book, where the end of a branch or twig was injured by cold weather, when the trees were trimmed after the first of March; neither have I observed any ill effects from pruning pear trees in April, although in the latter part of the month, if warm weather sets in, the buds swell rapidly, and leaves appear before the first of May. It is not best to do much cutting, except on very young trees, while the foliage is coming out.

When the trees are seven or eight feet high, the pruning can be done with greater ease and rapidity by the use of a trimming shears; the same as fig. 7.

The *Gardener's Monthly* published an essay on the "Philosophy of Pruning," read before the Pa. Horticultural Society, by Dr. J. A. Warder. After some very excellent general directions about the management of trees in the nursery rows, so as to give them the best form, the Dr. says: "The second object of pruning being to promote fruitfulness in the trees, it should be done chiefly during the summer or during the period of growth. At the same time or during the growing season, much may be done to advantage; both in thinning out and shortening in such parts of the tree as need these plans

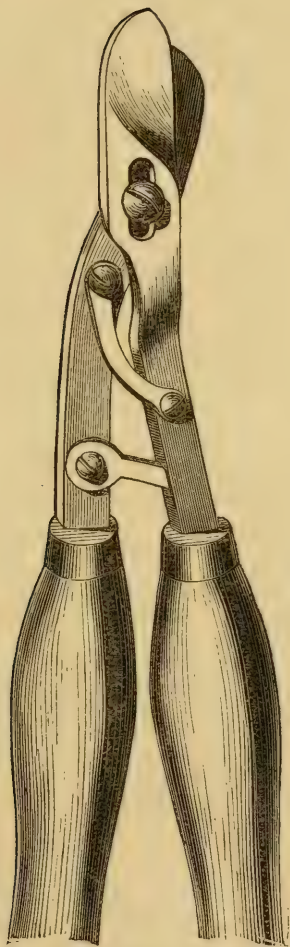


FIG. 7.—TRIMMING SHEARS.

of treatment. Various methods are pursued to produce fruitfulness, all of them depending upon the fact that this condition arises from the natural habit of the tree, to make its wood growth very freely for a series of years, and then while the growth by extension is curtailed, to take on that wonderful change, by which the wood buds are transformed into those that expand into flowers and produce fruit. The study of these changes is called Morphology, and when the tree has reached this condition it is said to have arrived at its maturity."

To bring about this change, summer pruning should be resorted to, if the tree is inclined to make a strong growth of young wood. It should be done during the growing season, yet late enough that a second growth may not start. I have found from the 1st to the 20th of July the best time to perform this work at Newark, N. J. It is simply removing a portion of the present year's growth, cutting or pinching off from one-third to one-half of the young shoots.

By changing the course of the flow of sap from the extreme ends of the branches, the leaf buds are enlarged and changed into fruit spurs. When too many young shoots have started, they may be removed without injury to the tree, in fact, it will be an advantage, if they are taken out in July instead

of in the following March; for the amount of food necessary to bring these useless shoots to maturity will then be appropriated by the remaining branches. In summer as well as in winter pruning, the main object should never be lost sight of; to encourage the growth upward and outward, leaving the tree open enough to admit air and light.

Let me repeat once more, summer pruning must be performed with care and judgment. Many varieties will come into bearing in four or five years from the time of planting. On these kinds summer pinching is unnecessary, for it should be borne in mind that a young tree, to maintain a healthy condition, must continue to make new wood as well as to produce fruit.

There are many ways of changing trees from wood making to fruit making. I have pursued a simple and easy method thus to alter the habits of a tree. During March and April, or July and August, on trees not inclined to produce fruit, I select some young shoots, in different places on the tree, and carefully bend them into the form of rings. Fruit spurs, as in fig. 8, will appear on the curved portions, certainly within two years. This plan I prefer to the one usually practised, of bending and tying the end of the long branches to the body of the tree. In the former case the fruit spurs will be

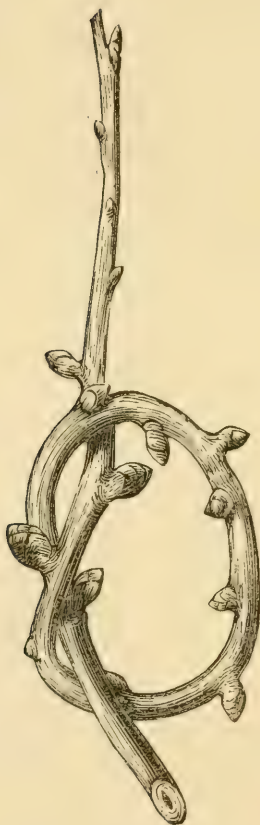


FIG. 8.—FRUIT SPURS.

formed near the body of the tree, while by the latter method the fruit will be on long branches that are more likely to be injured by wind storms.

When the trees attain the proper age to produce annual crops of fruit, the wood growth will be checked, and except to remove a branch occasionally, there will be little or no pruning required.

CHAPTER XI.

MANURING AND MULCHING.

THERE is probably no part of the care of fruit trees less understood, than that of furnishing the proper kind of food, and in the right condition to be appropriated.

Young pear trees are often killed by over kindness, in placing large quantities of unfermented manures in the holes before planting, and around the bodies of the trees afterwards. It should be distinctly understood, that both of these practices are likely to prove injurious to the welfare and healthfulness of the trees. It is now admitted that unfermented manure of any kind should not be placed near the roots of a young tree.

The following analysis, by Dr. Emmons, of the wood of the pear tree, shows that potash, lime, and phosphate of lime, are the three leading constituents:

	SAPWOOD.	BARK.
Potash,	22.25	6.20
Soda,	1.84	
Chlorine,	0.31	1.70

	SAPWOOD.	BARK.
Sulphuric Acid,.....	0.50	1.80
Phosphate of lime,.....	27.22	6.50
Phosphate of peroxide of iron,	0.31	
Carbonic Acid,	27.69	37.39
Lime,.....	12.64	30.36
Magnesia,.....	3.00	9.40
Silex,.....	0.30	0.40
Organic matter,.....	4.02	4.20

By the analysis of the ash of the fruit, 100 lbs. of fruit will give forty-three hundredths of one per cent. of residue.

The analysis is by Richardson :

ASH OF THE FRUIT.	
Potash,	54.69
Soda,	8.32
Lime,.....	7.98
Magnesia,	5.22
Sulphuric Acid,.....	5.69
Silicic Acid,	1.49
Phosphoric Acid,	14.28
Phosphate of Iron,	1.96

By an examination of the above figures the careful cultivator will see the necessity of preparing some special manure for his orchard, in order to

keep the trees in a healthy condition. The ordinary method of manuring does not supply the tree leading constituents in sufficient quantity to meet the requirements of the growing trees. Unless these substances are added in some form, the fruit trees cannot succeed.

Barn-yard manure, composted with muck and the salt and lime mixture, and thoroughly decomposed, is in a condition to be made available immediately, and it will give general satisfaction in producing both fruit and wood. This compost can be made much more valuable by adding, occasionally, small quantities of finely ground bones and wood ashes to the heap. Barn-yard manure should always be decomposed before it is placed near the roots of young trees. At the farm of the late Prof. Mapes, the following system of manuring pear trees has been adopted. After many years of careful experiments on an orchard of between three and four thousand trees, I am more thoroughly convinced that the conclusions arrived at by the lamented Professor are correct. By practising his method of treatment, the most gratifying success has been obtained,—fine healthy trees and abundant crops. The mode adopted is to apply super-phosphate of lime, at the rate of from 400 to 600 lbs. to the acre, mixed with twice its bulk of earth, and spread

broadcast over the surface. This top dressing is mixed with surface soil by the use of a horse hoe or small plow. The manure is thrown over all the surface between the trees, and not, as I have frequently noticed in different orchards, close to the body of each tree.

The orchardist should have, at all times, in some convenient spot near his fruit trees, a compost heap. If it is made up of barn-yard manure and old sods or head lands, the longer it is kept in the heap the more thorough will be the decomposition, and, as a matter of course, the manure will be in a better condition for appropriation. If swamp muck is accessible, and it can be purchased at one dollar for a two-horse load, it will pay to cart and compost it in the following way : the muck should be thrown up in ridges for some months before hauling to the yard or other convenient spot for composting. With every cord of muck, mix four bushels of salt and lime mixture, and then to every nine cords of this mixture add one of barn yard manure. The whole should be well worked together, and put in a square heap until thoroughly decomposed. The mass may be turned over once every three months, and at each of these turnings, small quantities of super-phosphate of lime, ground bone and wood ashes should be added in such a way that they may be evenly dis-

tributed throughout the entire heap. Such a compost should not be used until the end of the second year from the time of making. By that time the mass will be homogeneous, and have the appearance of spoiled cheese. If intended for ground not yet planted with fruit trees, it may be applied in convenient sized heaps on the surface at the rate of fifteen to twenty two-horse loads to the acre. Knowing the condition of the land, the owner can soon decide the quantity necessary. The heaps are then to be scattered evenly over the surface and plowed under. There are many intelligent pear growers, who merely apply the manure, and leave it on the surface, believing surface manuring to be the best method of application. With us it has not proved so, although we have instituted numerous experiments for the purpose of ascertaining the facts. In nearly every instance, the results have been in favor of turning under the manure, with the exception of the lime and ashes. Our experiments were not confined to a single crop, but were tried with nearly all our cultivated vegetables, and, as I mentioned above, the largest returns were from those portions of the ground where the manure had been plowed under.

During March and April, the compost may be scattered on the surface between the rows of trees, and when the soil is in a condition to be worked, in-

corporated with the surface soil with a horse cultivator or by means of shallow ploughing. It is too often the case, that the manure is shoveled close around the body of the tree. It will take a long time before it can be of any use in furnishing the tree with nourishment, on account of its distance from the rootlets through which the tree takes up its food. It should always be borne in mind that, at the end of five or six years from the time of planting, the roots will extend several feet from the body of the trees, and if they have been set out 12x15, manure spread anywhere on the surface will come in contact with the roots. If profit is a matter of consideration, then keep the land in good "heart" by annual dressings of manure, and the outlay will be returned ten fold. I have in numerous instances, to single specimens at a time, applied the manure in a liquid form; and, when care is taken, I have not the least doubt of it being the most economical and best way. I know of one or two cases, where young trees have been injured by the application of large quantities of liquid manure from the barn yard. It should always be diluted with four or five times its bulk of rain water, then it may be given in moderate doses once at week until the first of August. If the applications are made much later than this date, the young wood will be succulent and liable to be

killed during the winter. Where this method is to be practiced, I would advise that the ground, for three or four feet around the body of the trees, should be mulched with hay, straw or other litter. This will prevent the ground from baking and forming a crust on the surface, besides it will keep the surface at an even temperature during the growing months.

MULCHING.

In any part of the country where charcoal dust, from locomotives or old charcoal bottoms, can be procured easily, there is no substance that will make a better mulch for pear trees. It is a good absorbent, darkens the soil, and it will retain ammonia and other gases that assist in the healthy growth of all plants. We used this article for mulching for many years, and only stopped because the source of our supply was cut off.

When the surface of the ground, as far as the roots of young trees extend, is covered by a mulching of some material, one-half an inch in thickness, the effect on the trees is equal to a partial manuring. This may readily be accounted for. In the first place, the heavy rain does not compact the surface, but it gradually filters through the mulch; and secondly, the surface soil is moist at all times during

the summer months. I find in our orchard, that when the ground around the trees has been well mulched, not only the growth of wood is more uniform but the fruit is larger. This, too, on pear trees otherwise receiving the same treatment. I was so convinced of this fact, that for the past four years, one part of the pear orchard has been kept covered with hay the whole year, except when removed to apply the spring dressing of manure.

We always procure an abundance of "salt grass" from the low meadows lying within one mile of our place. This we find an excellent substance for mulching the pear orchard. During the winter the hay is carted home and left in heaps in convenient places until summer, when it is spread over the ground, about half an inch in thickness. This serves a three-fold purpose; it prevents the weeds from growing, and, as stated before, keeps the surface moist. Another advantage is, the pears that drop or are blown off by heavy winds in the fall, are not bruised and rendered unsalable, as they would be, falling on ground without a mulch, especially if the land is stony. It is a wise course to follow under all circumstances, when material can be obtained. It will require about four or five tons to the acre the first year; each succeeding year, half that quantity will be enough, as from one-third to one-half of the

old mulch can be again used. The amount saved in the labor of keeping the ground clean, will, in many cases, pay for the mulching material after the first year's outlay, and a much less quantity of manure will be necessary to keep the trees in a healthy condition.

CHAPTER XII.

GATHERING FRUIT.

THIS operation should be performed with care, but not until the seeds have changed from a white to a brown color, and then by raising the pear in the hand if it separates easily at the end of the stem. The fruit spurs or buds of the pear, being already developed for the next season, if the operator is not very careful while gathering the fruit, many of these spurs will be broken off and the crop of the following year will be thereby lessened.

The whole of the fruit should not be removed at one picking, for it seldom happens that it is all equally far advanced. There is generally a difference of ten or twelve days in the time of maturing even on the same tree.

Our method is to go over the orchard three or four different times, taking off only those specimens that are in condition to be placed in the fruit room or closet. With a little practice, the eye, at once, detects the pears that are ripe enough to gather.

Pears will always sell more readily and bring

higher prices with stems than without them. Therefore, in gathering or handling fruit, this fact should be taken into consideration.

Fruit, as fast as gathered from the tree, should be placed in baskets by hand. If roughly handled, the fruit is bruised, and the bruised parts will rot instead of ripening ; this, as a matter of course, will materially injure the sale as well as the quality of the pears. If the fruit is to be sold, it should be assorted at the time of gathering—the large, medium, and small sized should be placed by themselves, and immediately removed to the fruit room or detention house ; the latter should be dry and of even temperature, not more than fifteen degrees above the freezing point. Such a room may be arranged in the second story of an ice-house, with double doors, windows, sides and roof, the space between need not be filled with charcoal, spent tan, or other materials, for if the parts are tight, it will be found that a space of confined air is the best non-conductor.

Fruit taken off in the way described, will not shrink by the after evaporation of its moisture. Nor should it be left on the tree sufficiently long to permit any of the chemical changes constituting the ripening process, that do not require assistance from the functions of the tree itself. Most fruit when

ripened in a fruit room is more beautiful in color, has a finer aroma, and is much richer in flavor than if ripened on the tree.

When the skin of the pear ceases in degree (as it does in the fruit room) to exercise those powers which it possessed while growing, it becomes impervious, and all the sugar formed and the flavor developed are retained. It is for this reason that pears ripened off the tree are so superior to those which are allowed to come to maturity on the tree.

The difference between a detention room and an ordinary fruit room should be distinctly understood. As each kind of pear is superior in quality, when ripened at its own particular date, pears that are best in flavor and quality in January, should not be ripened in December. An increased temperature will cause them to ripen any time after gathering. The detention room prevents premature ripening, and the fruit for market may be kept until such time as high prices may be realized. When the proprietor has no such room to keep back his pears, they must be marketed soon after gathering. There are so many fruit growers in this position, that every season there is a period with each leading variety, when it becomes a "drug in the market." This is especially true of the Bartlett and the Duchesse d'Angoulême. Prices accordingly fall, at times when

the market is overstocked for a few days, and Bartletts are frequently sold from \$6 to \$9 per barrel; although two weeks later, the same variety and quality of fruit will bring readily from \$16 to \$20 per barrel. Pear growers with a limited amount of capital can easily construct a room on top or on one side of an ice-house, and keep back a portion of their crop. In this way the fruit will soon repay the outlay for the room. As to the part intended for family use:—when the proper date of ripening occurs, move such as it is desirable to ripen and place them in a warm room. The temperature of this apartment may be regulated as desired, the higher the temperature, the sooner will the fruit ripen. With most varieties the slow process gives the best results. In the detention house, as well as in the fruit room or cellar, the light should be entirely excluded from the fruit, for on this precaution depend the color, firmness, and in part the flavor. A friend told me a few days ago, that he has kept his winter varieties with but little trouble in the following manner: The pears are carefully gathered from the trees by hand, placed in baskets, and taken to his cellar. He then packs them in barrels or boxes, with alternate layers of dry oat chaff, until the barrel or box is filled. The head or cover is put on and left in this way for about three weeks, when the pears are care-

fully taken out and the chaff exposed on a cold, dry night. Early the next morning the fruit and cold chaff are replaced in the barrel and put away in the cellar until it is time to make use of the pears. The fruit may be kept much later than its proper date of ripening by exposing the chaff three or four times during the winter to a severe frost.

Buckwheat or rye chaff will answer equally well for this purpose. It is neither necessary nor judicious to surround the fruit with cotton, charcoal, sand, or other material. With such treatment pears lose their flavor, and become comparatively valueless; even unsized or absorbent paper will in a measure have the same injurious effect upon them.

CHAPTER XIII.

MARKETING PEARS.

THERE are many practical horticulturists who thoroughly understand the details of growing fruit but they do not fully appreciate the importance of sending pears to market in clean, new barrels or boxes, and in such a manner that they may surely arrive at their destination in good order.

It is a painful fact to record, that the majority of the fruit sent to the New York market arrives in bad order, and, in most cases, it is the fault of the grower. One of the partners of a large fruit and commission house, recently informed me that at least three-quarters of the pears consigned to their house, arrived in a damaged condition; and, as a matter of course, such fruit has to be sold for much less than if some care is taken in selecting the barrels, and in assorting and packing in such a way that the pears are not injured by being shaken about on the way to market.

Fruit does not differ from other articles of merchandise, its good appearance goes a great way, and

“covers a multitude of sins.” Choice specimens should not be placed on the top of the barrel; for purchasers usually “empty packages,” and if the fruit grows smaller in size and inferior in quality as the bottom is neared, every one knows to what decision the buyer will come. That brand will not be sought for by the same party the second time. On the contrary, if the fruit is uniform in size throughout the barrel, not only is the same brand bought again, but it becomes known in the market; it will always command the highest price, and will sell readily, when the same kind of fruit carelessly packed, is comparatively worthless.

It is not an unusual sight to witness in the New York market a barrel containing four or five different varieties of pears, about as salable as “*Mrs. Toodles’ Wheelbarrows*.” Large and small varieties, fall and winter kinds, some with and others without stems, evidently thrown into the barrel from a bushel basket, in the same rough way as is customary in barreling potatoes or corn. The greater part of the fruit packed in this way will rot before ripening, a fact well known by all fruit dealers, and it must be sold for anything offered, rather than have a total loss.

Specimens of such fruit and packing can, at almost any time, be seen in passing through the fruit

market. I have frequently taken from the same package, from three to six different varieties of pears.

Fruit dealers or commission men are often accused of dishonest dealings, when the prices anticipated by the consignor have not been realized; but on examining a number of such cases, to which my attention had been called, I found that the fruit was carelessly packed and not sorted.

To give some idea of how little demand there is in market for badly packed fruit, I will relate an incident, that came under my observation, a few years ago. While talking with a fruit dealer, he called my attention to a barrel of Duchesse d'Angoulême pears, which I noticed contained *some* fine specimens, but the majority were very poor. He said: "I have offered that barrel for \$5, and even at that low price no one feels inclined to buy it." I suggested to him to empty the barrel and sort the fruit, which he did, and, while I was standing there, he sold a single basket taken from the barrel for five dollars. This may illustrate to people not familiar with the sale of fine fruit, the utter folly of sending to market pears not carefully sorted and packed.

On one occasion, during our early experience in marketing pears, we sent to a commission house, two barrels of very choice Duchesse d'Angoulême,

packed in the ordinary way. I was at the store when they arrived. On opening the barrels, the fruit had settled, and it did not look as well as I expected. The commission merchant told his man to repack one of the barrels for my benefit, and requested me to wait and witness the result. In fifteen minutes both barrels were exposed for sale. Soon a buyer was on hand; the repacked barrel sold readily for fifteen dollars, while the same person refused to take the other barrel for ten dollars, although in quality and quantity they were alike.

This single instance taught me a valuable lesson about packing pears for market.

In every case, no matter how small the quantity of fruit to be sold, pack in clean, sound barrels or boxes. It is certainly poor economy to save ten cents in buying a second-hand flour barrel, when you are sure to lose more than five times that amount on the price of the fruit, by having it packed in a soiled barrel instead of a new one.

When the fruit attains the proper stage of ripeness for shipping, pick the pears by hand and put them into baskets. Then take a barrel, turn it upside down, and remove the bottom by driving off the hoops. Place some cheap white paper inside over the lid and around the sides,—fruit looks better when the barrel is thus lined. The pears are then

laid on their sides closely together, until the top of the barrel is covered. A second layer is added, in the same way as the first. Continue in this way until the barrel is one-third full; then shake gently so that the fruit will settle without being bruised. This shaking should be repeated several times until the barrel is full, when the pears should be in such a position that the bottom of the barrel, when pressed in, may come in direct contact with the last layer. The hoops should then be put on, and four small nails driven through them, to keep them and the bottom in place. The barrel may be marked 1, 2 or 3, so that the consignee may know the quality of the fruit without opening each package, although he should always be advised by mail of the number of packages and the quality of the fruit shipped.

We send the larger part of our pear crop to market, packed in new half-barrels, and, as a general rule, it commands a higher price in these packages, especially if the fruit is very choice.

The retailer, fancy fruit-dealer, and hotel keeper buy these packages in preference to the larger ones. If half-barrels are used, pack the fruit in the same manner as in barrels.

When the cover is taken off from pears packed in this way, each pear lies close in position, the appearance presented is inviting to the purchaser, and

the highest market price can be readily obtained for them. It requires only a little practice to become quite expert in packing fruit in the way described. When baskets are used, they should be lined with white paper, and the pears laid in carefully. Shake the basket gently, occasionally, so that the fruit may settle, and fill the basket a little above the rim, then put on the covers and forward the fruit with as much care as possible to its destination.

It is not desirable, however, to send fruit to market in small baskets, unless the grower delivers his own fruit to the dealer. In sending baskets by railroad or steamboat, the fruit will be stolen from the baskets, and it is a difficult undertaking to get redress from such corporations for losses of fruit.

CHAPTER XIV.

PROFITS OF PEAR CULTURE.

DOUBTLESS, many persons fond, of horticultural pursuits, would have turned their attention, to and invested capital in, pear culture, if it had not been for the bugbear that has been trumpeted through different channels for years—"that in a short time there will be so many pears in market, you cannot give them away." This we have heard frequently for the past fifteen years; but the demand for fine fruit and the prices obtained have steadily advanced.

That there have been failures no one will deny, and I have no doubt, if we had a true record of all who have planted pear orchards, there would be summed up three failures to every success. This is the case, to the extent of my own observations, among pear growers. The trouble is not, that the market is overstocked with well grown pears,—on the contrary, the demand is more than the supply. But there are too many persons who can echo the cry of the grower, who said to me a short time ago—"What difference does it make to me what prices

choice fruits are selling for, when I have none to dispose of. My trees are dying instead of bearing."

This is the case with many orchards that were planted ten or fifteen years ago, before many fruit culturists were aware of the fact, that all varieties will not succeed equally well in the same locality, but that soil and climate exert an important influence on the vigor of the tree as well as on the quality of the fruit. On our place, the Duchesse d'Angoulême is one of our leading kinds. It has only failed to produce a fair crop, three times in fourteen years. In many other localities, this tree grows well, blossoms freely, but it does not set its fruit, and it has the reputation of being a very uncertain variety. Then, as I have said before, the quality of fruit grown in different localities, differs very much. On the clay soil of New Jersey the fruit of the Duchesse d'Angoulême is first quality, while in many parts of Long Island and of West Chester Co., New York, the quality is quite indifferent.

In a former chapter, I endeavored to point out some of the causes why so many fail in their attempts to grow pears with profit for market.

There is no doubt but pears can be grown successfully and made highly remunerative, provided the necessary conditions are complied with. There

are greater inducements offered to the producer *now* than ten years ago. The average prices are higher and the *demand* still exceeds the supply. Once or twice within a period of twelve years, pears have been sold very low, and although, at the time, quite discouraging to the producer, still such incidents, to use a common phrase, *pay well* in the long run. When choice fruit is plenty and cheap enough to be bought freely by all, the taste is educated, and in after years, this aquired taste has to be satisfied, even at higher prices. Fine fruit, especially pears, when sold from \$16 to \$30 per barrel are a luxury that can only be indulged in by the wealthier classes. But, like the small fruits, pears will eventually find their way to the homes of the working classes. If the time should ever come that one-half of the amount now spent for alcoholic decoctions, should go for choice fruit, what a difference there would be in the homes of many of our poorer classes, now rendered almost desolate by the use of intoxicating drinks.

As a nation we should use more fruit and less animal food. Judging from the rapid increase in the consumption of small fruits within a comparatively short time, there is no doubt but the demand for pears will steadily keep pace with the supply, and no reason to fear that the markets will be over-

stocked. If occasionally prices range low, or receipts from the sale of fruits are lessened by some exceptional cause, we should not feel discouraged,—similar occurrences happen in all branches of trade. There are but few merchants or manufacturers who have not been compelled, at times, to sell their goods below the actual cost. This does not dampen their enthusiasm, it rather stimulates their efforts to make up for bad seasons.

The subjoined list of the prices per barrel, for which pears were sold in the New York market in 1866, '67, '68, I obtained from a responsible fruit merchant, who kindly placed his sales books within my reach; thus enabling me to get accurate data on this important point. These figures also show the comparative market value of the leading varieties of pears for the last three years. It will be observed that the prices for 1868 averaged higher than the two preceding years. This was, in a measure, owing to a partial failure, both of the peach and pear crops, last season, in the Eastern States. Where there are three prices per barrel, opposite one variety, such as \$10 to \$16 and \$25, the first two apply to the main crop, and the third, to choice fruit of extra size, or else to a portion held back, until the chief supply was out of market.

In looking over the sales of pears in the New York market, I find the prices for summer varieties, are affected by the peach crop, ranging lower when peaches are abundant, than they do, if peaches are scarce and high. This of course will not influence fall pears, and there is consequently less fluctuation in the prices of the later varieties.

The accompanying list (page 101) fully demonstrates to the fruit grower this important fact, that the varieties most extensively cultivated have steadily advanced in price. In 1858 we sold Duchesse for \$1.50 per basket, or \$7.50 per barrel. Last year we sold them at \$6 per basket, or \$30 per barrel. In 1867 the same quality of fruit sold readily at \$20 per barrel. That year the crop was an average one, except in a few localities.

When a young orchard comes into bearing—say five years from the time of planting—the trees will produce from \$50 to \$75 per acre. The trees at this stage require strict attention; some may be inclined to overbear, others to make too much wood. From the former, a part of the fruit set should be removed before it attains the size of a walnut. If too much fruit is permitted to remain on young trees, it will take several years of careful management to repair the damage done. When they are making too much wood, and they are not inclined to produce fruit, a

PRICES OF PEARS.

KINDS.	1866.			1867.			1868.		
	PER BBL.								
SUMMER BELL,.....	\$ 6 to 8	.....	\$ 5 to 9	.....	\$ 8 to 12	.....		
BARTLETT,.....	10 to 16 & 25	.....	12 to 18 & 30	.....	18 to 25 & 45	.....		
DUCHESE D'ANGOULÊME, ..	12 to 18	.....	14 to 20 & 25	.....	15 to 20 & 25	.....		
BEURRÉ BOSQ,.....	14 to 18	.....	15 to 20	.....	18 to 20 & 30	.....		
BEURRÉ DIEL,.....	12 to 16	.....	14 to 16 & 20	.....	16 to 18 & 20	.....		
BEURRÉ CLAIRGEAU,.....	16 to 20	.....	18 to 20 & 25	.....	20 to 25 & 30	.....		
FLEMISH BEAUTY,.....	10 to 14	.....	12 to 16	.....	14 to 16 & 20	.....		
LOUISE BONNE DE JERSEY,	12 to 14 & 20	.....	14 to 16 & 20	.....	14 to 18 & 22	.....		
VIRGALIEU,	12 to 18 & 25	.....	14 to 18 & 25	.....	14 to 20 & 30	.....		
SECKEL,.....	14 to 16 & 25	...	16 to 18 & 30	.....	16 to 20 & 40	.....		
LAWRENCE,.....	14 to 18	.....	16 to 22	.....				
POUND,.....	6 to 10	.....	8 to 10	.....	10 to 12 & 20	.....		
VICAR OF WINKFIELD,.....	8 to 14	....	10 to 14 & 18	.....	10 to 16 & 20	.....		

judicious method of summer pruning (described on another page) should be instituted to change the habits of the trees.

When the trees are ten years old the receipts should not be less than \$400 per acre, and there will be a steady increase in the returns, under proper management, until the trees have been planted fifteen or sixteen years, when the receipts will be at least from \$600 to \$800 per acre, and in many cases much larger. When choice pears command from \$10 to \$30 per barrel, as they have for the past three or four years, and this with a brisk market, it affords encouragement enough to induce horticulturists to make every effort to produce the best specimens of the varieties that the market demands.

To give an account of the sales of fruit from our entire orchard would be unsatisfactory, on account of the difference in age of the trees, varying, as they do, from two to seventeen years.

Ten years ago I selected a single row of thirty Duchesse d'Angoulême trees, planted ten feet apart in the row. Since then I have kept an accurate account of the total sales of pears from these thirty trees. They are now eighteen years old, and they have produced seven crops in nine years. The trees are at present looking very well, and, if we can judge from appearances, they will continue to be produc-

tive for many years. They were originally dwarfs, but I am quite confident they are now standards. This is true of the majority of the Duchesse d'Angoulême trees in the orchard.

The following statement gives the amount of each year's sales:

The 1st crop, the trees eight years old, \$120.00				
"	2d	"	"	139.41
"	3d	"	"	156.17
"	4th	"	"	202.28
"	5th	"	"	267.49
"	6th	"	"	310.20
"	7th	"	"	705.00
Total.....				\$1,900.55

This row, two years ago, produced ninety-four bushels of marketable fruit, which sold for \$705. There was a scarcity of peaches in market, and pears in consequence brought higher prices than usual.

I will state in this connection, that this row is the oldest in our orchard, no other of an equal number of trees has yielded so abundantly.

We have single trees that will yield more. In 1865, we sold from four trees, grafted only nine years, \$100 worth of fruit. Since then we have gathered from one of these four trees, nineteen

baskets of Bartletts, and sold them on the premises for \$2.50 per peach basket, making \$47.50 from a single tree. Under date of August 2d, 1869, Dr. Sylvester, of Lyons, New York, writes to me about the sum realized from forty Louise Bonne de Jersey trees ten years planted. He says :

“ The orchard is on one of those ridges so common in this region, and has an Eastern aspect. These trees occupy four short rows, ten in a row, making forty trees in all, in the orchard. They were planted in 1858, and were ten years old at the time of the crop, which was in the autumn of 1868. The trees had received good cultivation, but have never been highly manured, as the soil, which is a gravelly loam, is sufficiently strong to produce healthy trees with moderate fertilizing. They were planted ten feet each way (I should now plant 12 or 14), and hence do not occupy but little ground ; allowing for five feet of ground outside the rows, the amount of land is about one-eighth of an acre. The forty trees produced, in 1868, forty bushels of selected pears, which sold in Washington Market, New York, for six (\$6) dollars per bushel, average price, or \$240 for the one crop, being at the rate of *nineteen hundred and twenty dollars per acre*. These were not selected rows, but were all together, and all the Louise Bonne de Jersey trees there were in the orchard ; and I am

pleased to say that at the time of writing this (August 2d, 1869) the same trees have a fair crop, I should estimate that there are two-thirds as many as last year."

From practical experience, we are thoroughly convinced that pear culture can be made to pay a large profit, and that it is a safe investment when fruit growers are willing to comply with all the requirements. We have found it profitable, although, during our apprenticeship, we met with many reverses. But, instead of being discouraged by these drawbacks, they only incited extra efforts on our part.

CHAPTER XV.

PROPAGATION, BUDDING AND GRAFTING.

IN a purely practical work like this, on the "Profits of Pear Culture," it would be out of place to give a detailed account of the history of the pear; my intention has been throughout, to give only such facts as may prove of value to those about to embark in the business, or may be of some assistance to those already engaged in it.

It is quite evident from the facts stated, that no fear need be entertained of the markets being, at an early date, overstocked with pears; but there is every reason to believe that choice fruit will always command paying prices, and that the careful cultivator will always be rewarded for his labor in this branch of horticulture. As pear culture becomes more systematized and the science of growing trees better understood, the introduction of any new and valuable varieties will be cordially received by the horticultural public throughout the country.

It may justly be said that "Young America" is still in her childhood in pear growing, for at no time

in our history as a nation has there been greater need of practical and definite information on the subject of horticulture than at present.

All new varieties must be obtained by sowing seed and waiting patiently for such seedlings to produce fruit. This was a slow and tedious process, taking from fifteen to twenty-five years, before enough data could be gained, either to recommend or to discard a seedling. This length of time, however, has been overcome, and now, with the practical application of budding, grafting and pruning, the same results can be secured in five years that formerly took a quarter of a century.

PEAR STOCK.—The established varieties are easily multiplied by budding and grafting. What are known as standards, are budded or grafted on pear roots; and dwarfs are those worked on the Angers Quince roots, which make a good union with some varieties of the pear.

Although pear suckers are sometimes used for stock, seedlings are always preferable for this purpose. The business of growing seedlings for stock is quite distinct from the general nursery trade, and many who propagate pear trees on a large scale, purchase their stock from some one here, or import their yearly supply.

In order to grow healthy seedlings for stock, the

ground must be deep and in "good heart," not over stimulated by putrescent manures. Collect the seed from the common pear, and sow it in shallow drills in April. During the summer the surface of the ground should be kept loose and entirely free from weeds. If not large enough for transplanting when one year old, the bed should be mulched with salt hay, straw or other litter, as a protection against the alternate freezing and thawing, which often destroy large numbers of seedlings. In the fall of the second year, the seedlings may be "lifted" carefully, and the roots with a portion of the body packed in moist sand or earth, and placed in a cellar until spring, when they should be transplanted into the nursery. The plants are to be set about a foot apart in the row, and the rows three to three and a half feet apart.

By the first of August, the bark will separate readily from the wood, and the stock may then be budded with such varieties as are wanted.

The buds should be taken from young healthy trees. An active person will set from 2 to 3,000 buds in ten hours with another person to follow and tie.

The branches of buds are cut from the growing trees and trimmed as seen in Fig. 10. The operator then cuts off six or eight buds at a time, and places

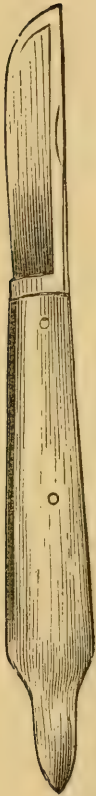


FIG. 9.—BUDDING KNIFE.



FIG. 10.—BRANCH OF BUDS.



FIG. 11.



FIG. 12.—A BUD.

them between his lips, thus leaving both hands free to use the budding knife. The incision in the stock is made in the form of a T, the bark is separated by pushing down the ivory part of the knife, opening both sides of the cut at once. This I find an improvement on the old fashioned knife, which requires two movements to do what can be done in one with the knife as seen in Fig. 11.

The part of the bud that projects above the cross incision can be cut off.

The bud is then fastened by wrapping around the stock above and below the eye a narrow band of bass matting.

In the orchard, on large trees, to change the variety, I have, instead of grafting, frequently inserted, during the month of August, scions three inches long. The scion is beveled on one side and pressed into an incision made in the branch (Fig. 13), and fastened the same as in budding. It might be termed summer grafting. In the following February or March, in case the



FIG. 13.

bud or scion has "taken," the stock is cut off just above where the bud was inserted, making the cut on the opposite side from the bud. In the ensuing May, the eye will push forth, and at the end of the growing season, the young tree will consist of a single upright shoot, as described in the chapter on pruning.

DWARFS.—The Angers Quince is the best variety yet known for dwarfing the pear. It has been extensively used in this country for the past twenty years. But as little or no discrimination was exercised about the varieties of pears to which it is really adapted, it has failed to give satisfaction in many localities and now its condemnation is as severe as its former laudation was extravagant.

This variety of quince is propagated for nursery purposes by layers and cuttings. The latter are made about eighteen inches long, and set out thickly in rows. When one year old, they are "lifted" and planted in the nursery and treated in the same way as described for pear seedlings. The quince stock is more easily propagated than the pear, it is more certain to "take," and it is therefore a favorite stock in the nursery.

In budding the quince stock with the pear, from ninety to ninety-five per cent. of the buds will grow, but of many varieties of pear, budded on their own

stock, not more than fifty per cent. of the buds will take the first season.

GRAFTING.—There are few persons, indeed, who have planted pears, either in the garden or orchard, who have not been compelled, sooner or later, to learn the simple art of grafting, that they may be able to make such changes in varieties as experience dictates. This operation is all important to the wide-awake orchardist, in order to substitute profitable for worthless varieties, with the loss of as little time as possible. There is nothing more discouraging to the fruit grower, after having waited ten or a dozen years, than to find it necessary to put a new head on his trees before getting any returns. But, under the circumstances, it is the only choice left.

There are many methods of grafting practised in this country. We have adopted in our orchard cleft grafting; for large stocks I prefer it to the other modes.

In the latitude of New York, we commence grafting the pear about the first of April, and continue through the month. On large trees, we graft about one-half of the top the first season, and the balance in the spring of the second and third years.

The branches are sawed off about twelve or eighteen inches from the body of the tree, and the top of the stock made smooth with a sharp knife.

The stock is then split in the center, by means of a large knife with a broad back, ten or twelve inches long, beveled on both sides. The knife is struck with a wooden mallet, splitting the stock two or three inches. A wedge is then placed in the center of the stock until the scions are prepared and pressed in place, when the wedge is withdrawn. The stock immediately closes on the scions and keeps the grafts firmly in place.

CLEFT GRAFTING.—When inserting the scions, their inner bark should correspond to that of the stock. Then cover the top of the stock and both sides, with grafting wax. In two weeks the buds of the scions will begin to swell, and will frequently make five or six feet of wood the first year. During the summer, in consequence of cutting off a portion of the top of the tree, a number of young shoots will start from the old stock. These should be removed; if allowed to remain, they will materially injure the growth of the scions. The scions should be cut back the following spring, so that they will throw out side shoots, near the union, and form a stocky and symmetrical head.

WHIP GRAFTING.—This method, although not often made use of in the orchard, is very common with nurserymen for grafting seedling stocks. These are lifted in the fall and heeled in. During the

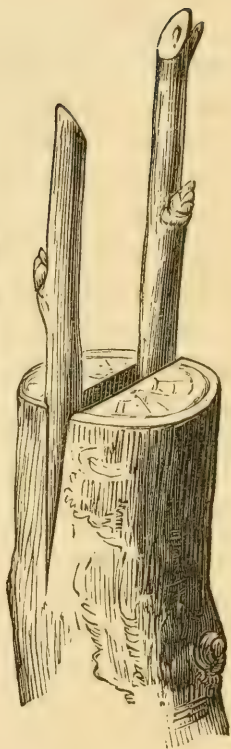


FIG. 14.—CLEFT GRAFTING.



FIG. 15.—WHIP GRAFTING.

winter the scions are prepared, the stocks grafted, and carefully packed away with moist earth or sand, until they are planted in the open ground the following spring. If they grow well, the nurseryman gains one year over budding. The stocks and scions must be prepared and put together with great care. They are fastened by winding around the stock narrow strips of strong paper or muslin, coated with grafting wax and well secured.

GRAFTING WAX.—A neighbor, who, for the past twenty years, has been very successful in grafting in this vicinity, makes his own grafting wax. He uses the following materials, in the relative proportion named:

4 lbs. white rosin.

1 “ bees wax.

1 pint of linseed oil.

These substances are put into an iron vessel and heated until they can be thoroughly mixed by stirring. The compound is then thrown into cold water, and worked by hand in a similar manner to drawing molasses candy.

At first the wax will be dark brown, but when sufficiently worked the color changes to a light yellow. The wax is then formed into round sticks, three or four inches in length and one in diameter. It may be kept in water until wanted for use.

For late grafting, four and a half pounds of rosin should be used, to prevent the wax softening under a hot sun when first applied.

Before handling the wax, either in making it or in grafting, the operator should oil his hands, or else he will experience some vexatious moments in the endeavor to get rid of this tenacious substance. I have used this kind of grafting wax for ten years, and I can vouch for its superior quality for orchard purposes. Wax made from the above receipt is worked with ease in cold weather, it stands the heat of the sun very well, and is much superior in these respects to wax made with tallow instead of linseed oil. When tallow is used, the mixture is more sticky, for this reason many nurserymen prefer it in coating paper or muslin for whip grafting, described in another place.

CHAPTER XVI.

PRACTICAL SUGGESTIONS.

TREES GIRDLED BY FIELD MICE.—HOW TO SAVE THEM.—The obstacles with which the practical horticulturist has to contend are numerous. If he wishes his orchards to produce paying crops of fruit, he must be constantly on the alert, bestowing care on this or that tree, removing a branch from another, using the pruning knife for some special object, either to retard or encourage growth in a certain direction. The labor is not at all times arduous, but constant watchfulness is required, and sound knowledge of the business, before the thousand and one annoyances that are constantly occurring can be overcome.

No experience of the horticulturist is so dismal or discouraging as when, entering his orchard soon after snow disappears in the spring, he finds that his trees are badly injured—many fatally so—by the ravages of those abominable pests, the field mice.

The winters of 1867 and 1868 were the most severe, and, in many respects, the most remarkable,

known in this section for many years. From early in December, snow-storms followed each other at short intervals, usually accompanied by heavy wind, in certain places drifting and piling up the snow several feet high. About the first of March nearly all our pear orchard lay under a bed of snow five feet in depth, a part of which remained on the ground until the beginning of April. When the surface was clear, I soon found, on examination, evidence of the activity of these mice. Forty-one pear trees were injured—some half way round the body, others had but a narrow connection of bark left—and, to my great dismay, twenty-six trees, for which I would not have entertained an offer of \$500, were completely girdled. There were a number barked two feet above the surface of the ground, and some of the main branches were eaten badly.

Under the circumstances, it was imperative that something should be done. If left as they were, the trees could not survive. From each of them the bark had been most effectually removed, leaving a bare place of wood twelve inches wide.

Some years ago, in hunting up horticultural curiosities, I found, to my surprise, on the farm of John Brill, near Newark, a large cherry tree, about ten inches in diameter, that, when young, had been girdled, and in which he had inserted three scions in

an upright position. The tree was living and looking perfectly healthy. It was supported on three short columns, with the portion of the body that had been girdled, dead and removed, thus leaving an opening in the trunk of the tree between the columns.

Remembering the successful experiment with the cherry tree, I now set to work; prepared the scions by beveling them on the same side at both ends, and with a budding knife made an opening both on the upper and lower edges of the bark. In each tree that was completely girdled, I inserted three scions, and where there was a small connection of bark left, I inserted one scion. I fastened them by a band,



FIG. 16.

the same as is used in budding, and then put on some grafting wax, so that the air would be excluded where the ends of the scions were inserted. The adjoining cut is an accurate drawing of one of these girdled trees at the end of the first season. There were three scions inserted in this tree. By this simple means, every one of the trees were saved, and to-day they look as healthy and vigorous as any in the orchard. On this occasion, however, I found that the trees injured were those growing in or near grass, and although I could trace the paths of the mice in different parts of the orchard, no tree that stood in plowed ground had been touched.

The knowledge of this fact I consider valuable. In the future I will keep the surface of the ground entirely free from grass.

A WASH FOR PEAR TREES.—It has been remarked by a close observer of human nature, that the moral tone of a community can readily be estimated from a knowledge of the amount of soap used therein.

It may be said with equal propriety, that the health and fruitfulness of a pear orchard depends to a great extent on the cleanliness of the bark. To preserve an orchard in vigor and health, *the bark must be kept clean*. The growth of moss and fungi on the body and branches of a fruit tree indicates

an unhealthy condition, besides affording a covering for its insect enemies. When the bark is kept clean and smooth, they are forced to find shelter elsewhere.

For many years we have used a wash made by dissolving one pound of caustic potash in one gallon of water. This is applied to the trees with a brush, in the latter part of March or any time in April, before the trees come into leaf. Two applications of this solution will cleanse the bark thoroughly. On large and old trees that have been neglected, it is better to scrape the bark before applying the wash. There is no great amount of time required for the operation; one man, with a pail and brush, can wash the bodies and some of the main branches of from 150 to 200 trees in a day. One application in April will effectually remove the aphids or bark louse. Care should be exercised in washing the trees, not to touch the young buds or twigs, as it may kill them.

We have also used the "soda wash," made by dissolving one pound of caustic soda in one gallon of water. This is less powerful than the potash wash. It may be applied to any part of the fruit trees without injury to the young buds. Both of these washes are excellent for cleansing the bark of all kinds of fruit trees. Whitewash is sometimes used as a wash on fruit trees. It is better under all

circumstances, to apply the lime direct to the soil, and use either the potash or soda for cleansing purposes. As it requires 700 quarts of water to dissolve one quart of lime, if used as a whitewash, it simply forms a paste, which will fill the pores of the bark and do more injury than good.

THE BLIGHT.—This alarming disease, that has made such havoc among the pear trees in some sections, made its first appearance in our orchard four years ago. During this time we have had twenty-nine cases, fourteen of which have proved fatal, the others are now rapidly recovering from the effects. With us, this disease has been partial to certain varieties. For instance, out of the twenty-nine, sixteen were Glout Mercean, four Flemish Beauty, four Vicar of Winkfield, three Belle Lucrative, and two Louise Bonne de Jersey. Another singular fact in this connection is, that twenty-three of these trees were growing in the same section of the orchard, quite near each other, on low and naturally wet land. I do not believe, however, that the character of the soil or situation engenders this disease.

Our plan has been, the instant any tree showed signs of being affected, to saw or cut off the branches or main stem, six or eight inches below where the disease appeared. When the branches injured were large, we have put in some scions the following

spring. This treatment has been in a measure successful—saving more than half the trees attacked. The diseased wood was at once removed from the orchard and burned. Among the trees badly injured or killed by the blight were some of the most vigorous in the orchard, giving no outward indications of an unhealthy condition. In some cases the whole top of the tree was instantly killed as if by a stroke of lightning. To the practical orchardist this disease is in every way most alarming.

INSECTS.—To protect fruit trees from their insect enemies requires constant watchfulness at certain periods of the season.

The work is not laborious, but calls for prompt action. For the last four years the common tent caterpillar has given us more trouble in the orchard than any other insect. Unless instant measures are taken to destroy them on their first appearance, they soon make sad havoc with the foliage. The quickest and most effectual way to prevent their ravages, is to go over the orchard carefully in winter, and remove the eggs, which will be found deposited near the ends of the young branches and twigs. These eggs are protected by a glutinous substance which makes a rough looking surface that can be readily distinguished when the trees are bare of foliage. If any of these nests escape the notice of the operator,

then in the spring, when the young caterpillars make their first appearance in weaving their tents, instant measures should be taken for their destruction. Practically I find the best way to destroy these pests, is to remove the tents by hand, crushing the caterpillars at the same time. This can be done with or without a buck-skin glove. I have tried all other methods recommended, and consider this best.

The most effectual and easy way to fight the curculio with pears, is to have the pear trees vigorous and healthy by keeping the ground in good heart. For a number of years I have noticed that on strong healthy trees the pears very soon outgrow the crescent mark of the curculio, while on weak or sickly trees the fruit is usually disfigured, and worthless for market purposes. However, all such I remove from the trees at once, and also allow none that drop off to remain on the ground longer than twelve hours before being gathered, and taken to the hog pen. The safest method is to endeavor to keep the bearing trees healthy, and to remove at once all disfigured and worm-eaten fruit, whether found on the tree or ground.

CHAPTER XVII.

ORCHARD RECORD.

COMPARATIVELY few persons start a record of the names of their trees or their relative position in the garden or orchard at the time of planting. Everybody who plants trees intends to make such memoranda, but it is put off and finally forgotten, until the labels fastened on by the nurseryman are defaced by exposure. Then the tree is without a name, unless somebody recognizes the variety and satisfies the owner, who is most anxious to learn the name of the fruit and its date of ripening.

The subjoined orchard record is very simple, and will be found of practical value to the fruit grower.

It is intended that each variety should be represented by a number (for instance, let the Bartlett be represented by 1, Duchesse d'Angoulême by 2, Seckel by 3, and so on), and, by affixing the names of pears to the numbers designating the rows, we accomplish a double purpose. Of course, whenever the same number occurs in any other row, the variety is recognized at once by referring to the same

number in the side column of the page which indicates the rows.

On the upper side of the table we simply have a row of consecutive figures—1, 2, 3, 4, 5, etc.—so as to be able to find at once the 1st, 2d, 3d, 4th or 5th tree in any row. For instance, if 4 be the representative figure of the Seckel, then finding a 4 in the square vertically numbered 7 and horizontally designated by 8, we can at any time tell by consulting the table that the 7th tree in the 8th row of our orchard is a 4 (or Seckel). If this Seckel should prove a failure and we decide to substitute a Bartlett (or 1), then, by crossing off the 4 in our table and putting in 1 in the same square, we ever afterwards may see at a glance that the 7th tree in the 8th row is a Bartlett instead of a Seckel, which has been removed.

The same system of recording a change of sorts holds good in the case of grafting, budding, etc., etc.

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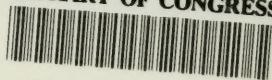
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